# CONSTRUCTION PROJECT PLANNING

## Improving Effectiveness of Resources Allocation

By

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## ABSTRACT

Several studies indicate that the effectiveness of Construction Project Planning (CPP) can be improved by increasing the amount of resources allocated to the task. There are also studies indicating that allocating resources beyond optimum point in planning activities may result in a lack of cost effectiveness because of an increase in overall project costs. Other research concludes that both, too little planning and too much planning are factors that can lead to poor project performance.

This research analyses the effectiveness of construction project planning and how resources can be allocated in a cost effective way, in all stages of construction planning. A review of literature is made on construction planning in general and on cost effectiveness aspect. Two samples are used from field research, one sample obtained from interviewing six senior construction planners from large construction firms in UK. Another sample is obtained from eight questionnaire survey from Dubai construction planners, who work for large international Project management consultants. The two samples are compared and analysed and the outcome is discussed. The emphasis is given on how to find strategies to improve the effectiveness of construction planning, while using the resources in a cost effective way, in all stages of construction planning.

A general guideline on how to carry out effective construction project planning is provided in a diagram, in concluding chapter.



Key Words: **Construction Project Planning, Cost, Effectiveness, Resources allocation, Building Contractors.**


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I have been fortunate in having interviews with experts in this field, who provided me with valuable information and the vision of the topic before I began a field research.

I would like to thank Mr. David Woolven of UCL, Mr. John Kelsey of UCL, and Mr. Leon Squire of Davis Langdon. I would also like to thank Mr. Jim Meikle for introducing me to Mr. Leon Squire.

Last but not least, I would like to thank Mr. Jubeir M. Shamte of Dubai Properties, for making sure that my survey questionnaires were completed within my programme.

**Words of Wisdom :**

*"On average, projects with poor planning can cost as much as 50% more than those with reasonable planning"*

(Callahan, 1992. See chapter 3)

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**Words of Caution:**

*"No plan survives first contact with the enemy"*

Attributed to Von Moltke

*.....Dedicated to my daughters, Halima and Safia, with love.*

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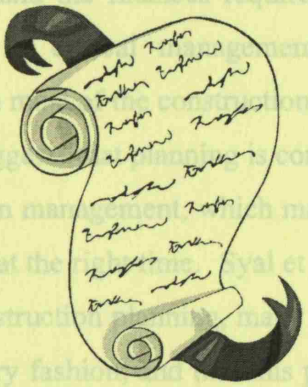
| | |
|---|---|
| CPP | Construction Project Planning |
| PPC | Project Planning Consultant |
| 4D | Four Dimension |
| CAD | Computer Aided Design |

# CHAPTER – 1
# Introduction



# CHAPTER 1
# Introduction

## 1.0 Rationale for the research

Construction Project Planning (CPP) is a process carried out at different stages of a project by experienced construction personnel who have broad knowledge covering areas such as technical, contractual, and legal, who communicate with other stakeholders to plan optimal sequence of activities, and to allocate resources to them. Mawdesley et al (1997) defines planning as a detailed scheme or method for attaining an objective. This includes the method, the activities to be carried out, the timing of the activities, the resources to be used, and the finances required. The construction project planning therefore is a critical management tool because it lays the framework upon which most of the construction decisions are made.

Packendorff (1995) suggests that planning is considered as the most important function of construction management, which may bring success, but only if it is carried out well and at the right time. Syal et al (1992) explains that despite the importance of Construction planning, many construction firms go through this stage in an arbitrary fashion, and that this problem is particularly serious for small and medium-size building projects[1].

Several studies have indicated that construction planning efforts usually fail to achieve their objectives (Laufer and Tucker, 1987; Cohenca et al, 1989; Laufer and Cohenca, 1990). Other research indicates that although construction project planning is a paramount preoccupation of contractors, the process is rapidly increasing in difficulty and that one of the difficult issues facing construction project planners is a continuous increase in the complexity of construction projects (Gidado, 1996).

[1] See research objectives and aims in page three.

In his other paper, Gidado (2002) looked at planning again and criticised it for not having a standardised procedure that is capable of improving the accuracy of predictions of project costs and time. He suggested that there is an increase of complexity in construction projects which is caused by technological advances, continuous fragmentation of the construction industry, and changes in the types of materials, plant and other resources. He argued that the effects of these changes are exacerbated by continuous demand from clients for speed, zero defects, higher safety levels, and environmental standards, and that as a result of these changes, the essential ingredient for main contractors in order to have successful delivery of projects is to have a right amount of detail, and at the right time in a planning process.

This confirms that there is a need to examine the amount of planning detail required in every stage of construction planning, so as to allocate the right amount of resources according to the requirement

## 1.1 Identification of the Problem

As we have seen above, there are several studies that conclude that construction project planning has a significant impact on the ability of construction firms to achieve success in implementation of construction projects. For example Laufer and Cohenca, (1990); Faniran et al. (1994, 1998) indicates that the effectiveness of CPP, and hence construction project performance; can be improved by increasing the amount of resources allocated to construction planning. It is clear however, that the increase of resources that are proposed to be allocated to planning activities will increase the transaction costs[2] to main contractors.

There are studies (example Neale and Neale, 1989) that indicate that allocating resources beyond optimum point in planning activities may results in an increase in overall project costs. Faniran et al. (1999) suggests that

[2] Hidden expenses created to every transaction which takes place - example in a process of preparing a tender, it could be caused by the costs of gathering information.

both, too little planning and too much planning are factors that can lead to poor project performance.

This raises the issue that there is no consensus on how much effort of planning should be carried out and in what stage. It also indicates that there is a need to strike a balance on the opportunity cost of doing and not doing enough construction planning. The balance has to take into consideration on the amount of effort to be allocated to planning at a certain stage, and the objective of planning at that stage.

For example should a main contractor carry out 80% of construction planning at pre-tender stage, and leave the remaining to other stages? What cost effectiveness will this decision have, in case the main contractor does not win the tender, and therefore awarded the contract?

Or does he carry out 20% of planning at pre-tender stage and leave the remaining to other stages? Again, what is the significance of this decision in terms of ascertaining the risks and uncertainties involved; example the constrains, the un-constructability problems, and hence the right tender price?

There is also a question of time, if a main contractor does 20% of planning at pre-tender stage, will he have time to do sufficient planning required at post tender period, between the award of contract and the commencement of site works?. If he does not have sufficient time, is the loss incurred during construction stage as a direct result of inadequate planning, justified by the savings of planning resources at earlier stage?. These are some of the questions that this study will attempt to answer, which form part of the intended objectives of this report.

## 1.2 Research Objectives and Aims

The aim of the research is to investigate how effectiveness of planning can be improved. The specific objective is to uncover how resources can be allocated in cost effective way, in different stages of construction planning. It provides a general outline on how strategies can be formulated to make CPP more effective, and how much resources should be allocated in planning

activities in different stages of planning, depending on the objective of planning at that stage.

The scope of this research is limited to a construction project planning of individual projects that take place within large and medium-size construction firms. It had been mentioned earlier in this chapter that the problem of planning is more serious to small and medium-size projects, which might imply that the problem lies more to small and medium-size contractors. However, this report will not concentrate on the small-size contractors for a combination of two main factors; the lack of cooperation and willingness of small contractors to participate in the requested interviews, and the time limit of finishing the report.

The stages covered by this report are pre-tender planning, post-tender pre-construction, and planning carried out during construction stage, which we will call "construction stage" planning.

## 1.3 Methodology

The primary stage of this report is the identification of the sources of information. One of the major challenge is to identify some of the broader parameters likely to be relevant in studying construction project planning. In order to achieve this objective, a comprehensive review of relevant literature will be conducted in order to develop an understanding of previous work in the field of construction project planning. The literature review will use text books, journal articles, research papers, and unpublished reports that are relevant to construction project planning. After reviewing relevant existing literature, informal interviews will be carried out to academics and industry's practitioners who either have written or they are involved in construction planning in order to understand in depth the process of planning in construction. Semi-structured interview questionnaires will be prepared for interviews with experienced construction planners in UK. Although interview method normally takes more time and is expensive compared to questionnaire survey, it was selected as a source of gathering primary data because it

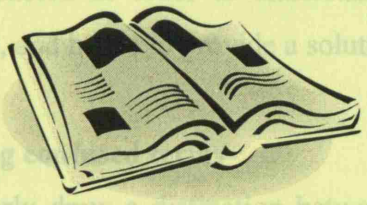
enables the interviewee to explain other issues that he/she thinks are important which might not have been mentioned in the interview. This is the reason the interview is semi-structured, with about ten percent of the questions as open questions. The questions cover a range of areas and they are designed to investigate how effectiveness of construction planning can be improved. The questions will focus on the three stages to be investigated; pre-tender, post-tender pre-construction and construction stage planning. A copy of the interview questions will be provided in appendix two. Building contractors to be interviewed will be selected from "Fame" database which enabled the writer to select their size and to ensure that only those that their main activity is building construction are selected.

## 1.4 The structure of the Report

This report is divided into six chapters including this introductory chapter. Chapter two contains a review of relevant literature regarding CPP, and its general descriptions. It includes definition and procedures of planning, the work of construction planners, by-products of construction planning, the use of computer technology in planning process, and financial aspect of planning. Chapter three looks on the advantages of construction planning and its costs. It also examines how resources can be allocated in a cost effective way. Chapter four provides the methodology of data gathering and analysis. Chapter five analyse in detail the collated data from survey data sheet, integrating primary data and the existing literature. Chapter six provides conclusions and recommendations, and a general guideline is provided on how effective Construction Project Planning can be achieved.

# CHAPTER – 2

# Literature Review



CHAPTER 2
**Literature Review**

## 2.0 Introduction

This chapter begins by explaining general procedures and stages of construction project planning, including the objectives of each stage and the concept of "The Last Planner". It proceeds by explaining the work of construction planner and by-products of planning process. It then looks at how planners coordinate with other actors in order to do their work effectively. Finally it examines the use of computer graphics technology in construction planning. Through those areas, this chapter will look in detail how CPP is conducted. This is done since most literature does not provide sufficient analysis of how CPP is actually carried out. This might be caused by most writers assuming that all the readers (and future researchers) are fully familiar with the process. The writer believes that it is important to understand how the CPP itself is conducted in order to understand the problem this report is attempting to solve, and hence to provide a solution.

## 2.1 Demystifying confused terms

First we must clearly draw a distinction between "Planning" and a "Plan". Planning includes the integration of a set of dependent decisions, a "plan" is the formulation of the result of this process (Laufer et al, 1993).

Project planning should not be confused to a project programming. The letter is a graphical schedule such as Gantt chart showing work to be done with associated times, which form the basis for effective planning (see appendix 4) (Kwakye, 1997& Gidado, 2002).

Scheduling also should not be confused with Planning. These two terms are not synonymous but they are related. However, the scheduling process for construction is just one part of planning effort.

## 2.2 Stages of Construction Project Planning (CPP)

Generally CCP is divided in three main stages, and for the purpose of this report we will call these stages as:

- Pre-tender
- Post-tender pre-construction
- Construction stage

### 2.2.1 Pre-tender planning

This is a stage where CPP is carried out by main contractor, prior to the submission of tender, as the name indicates. Main contractors carry out planning at this stage for two main purposes:

I. In case of a two-stage tendering, to ensure that the firm is invited to the second stage of tendering. As at the first stage price is not an issue, the objective is to prove to the client the contractor's capability and competence of being able to execute a project of such a size and complexity. While price still remains a major tender-winning factor, clients are increasingly using two-stage tendering to procure building works. In a research conducted by Kelsey et al (2001), it was reported by most planners involved in a two-stage tendering that the plan/method statement, together with the site team offered by the contractor were the two most important non-price factors in securing progress to the second tender stage.

II. In a single-stage tendering, the main contractor would want to make sure that they know as much as possible, the risks that are involved during the project period, and especially during construction period. The objective is to use that information so that realistic estimates of major items of work can be produced. Smith & Woolven (1991) identified activities that normally takes place and finalised at this stage, some of those are:

- Revised project brief and business case.
- Construction execution plan.
- Procurement plan.
- Cost plan.
- Coordinated designs.
- Health and safety plan.

The integration for design and construction also intensifies at its maximum.

Owing to the objective of planning at this stage, there is a conflict between making a plan which is too ambitious, and therefore achieve the objective of the contractor winning the tender, but may be found to be unrealistic at the implementation stage, or take a gamble by making a plan which is realistic, but faced with the possibility of not winning the tender. There is a similar problem to the estimator, in terms of unrealistic low rates and an over budget project. For example if the estimated cost is too high, then the contractor's chance of being awarded the contract is reduced significantly. However, if the estimated cost is too low, then the contractor's chance of being awarded the contract increase significantly, but the chance of making profit is diminished.[3] (Khalaf, 2004)

### 2.2.2 Project complexity

Complex projects are difficult to plan in the beginning of the project. Some of the planning therefore needs to be carried out as the process of construction continue.
Kwakye, (1997) suggested that in order to achieve the effectiveness of CPP, we must allocate resources according to many factors, including the complexity of the project. With the increasing complexity of construction projects, effectiveness of planning and control of projects represent more challenge in managing construction projects. Pre-tender planning leading to a cost estimate is normally used as a baseline for project control in the subsequent project stages. That is; construction planning and cost estimation are carried out in parallel to reach a realistic tender sum. With current system, the problem that main contractors faces when they are tendering for a complex project, is that not much scheduling can be carried out at pre-tender stage because scheduling requires a certain level of detail for the work items.
Abdul-Malak and Hassanein, (2002) proposed a "Rolling wave" approach for carrying out planning of highly complex projects. They describe the concept as a procedure for generating the first construction planning at pre-tender stage, and

[3] Construction Economists consider this as one of the reason for a contractor to be in a situation which they call "a winner's curse"

gradually developing it during the post-tender and construction stage. They suggest that the concept will allow work items with different levels of detail to be shown simultaneously in any version of the schedule. A typical example of a project where this kind of planning approach could be used is de-commissioning of a nuclear plant, which can take up to thirty years to complete.

### 2.2.3 General Procedures of CPP at Pre-tender stage.

There are several formats that CPP can take. According to Kelsey et al (2001) a typical sequence of CPP in UK is as shown below:

- Planner prepares a plan in consultation with a line manager, estimator and other actors.
- The plan is used as a basis for evaluating the risks involved in relation to costs.
- Planning team decides appropriate methods and schedules
- High level management of the main contractor evaluates the risks involved in a tender offer and decides whether they are commensurate with the prospective rate of return

The overall process of planning, pre-tender stage, and CPP hierarchy are summarised in a diagram in appendix 5, 6, and 7.

### 2.2.4 Post-tender pre-construction planning

This stage takes place after the contract award. The minimum duration of CPP is normally one month, which is a typical mobilisation period, but there may be a gap between a contract award and mobilization period. Sometimes this gap can extend up to two months beyond mobilisation period, making a total of three months. When this happens, it becomes an advantage to a main contractor in terms of having enough time to review the planning carried out at previous stage, and also to prepare a detailed planning for construction period. Mawdesly et al (1997) calls this planning stage as "Medium-term planning". He suggests that the objective of planning at this stage is to ensure that the targets set in the long-term plans (Pre-construction stage) are going to be achieved.

### 2.2.5 Construction stage planning

This is an execution stage where planning is carried out as the process of construction is proceeding on site. It is very critical that construction information is produced as and when required at this stage. Kwakye, (1997) suggests that more attention and time needs to be allocated to construction project information at this planning stage, as the success or failure of projects depends on the work which is carried out in this stage.

The planning at this stage is normally carried out in a weekly basis by line managers, although it would be normally under the supervision of the chief planner.

Mawdesly et al (1997) calls this planning stage as "Short-term planning". He suggests that the objective of planning at this stage is to ensure that the resources provided by consideration of the medium-term planning (post-tender pre-construction) are utilised in the most cost efficient way in order to achieve the project objectives, and to ensure that work proceeds with due regard to quality and safety of those involved. He also suggested that planning in this stage normally consider in detail the utilisation of the available resources, doing the work safely, economically and to the right quality.

## 2.3 The Last Planner Approach

The Last Planner approach is a mechanism for transforming what should be done into what can be done, thus forming an inventory of ready work from which weekly work plans can be formed. Including assignments on weekly work plans is a commitment by the Last Planners (such as site foremen and gang bosses) to what they actually will do. Last planners therefore, are an individual or a group who decides what physical and specific work will be done tomorrow. This type of plans has been called "assignments", which they are perceived to be unique because they drive direct work rather than the production of other plans. The person or group that produces assignments is called the "Last Planner" (Ballard and Howell 1994).

In another research, Ballard and Howell (1998) provided a critique on how shielding production can be used as an alternative strategy in a situation of work

flow uncertainty. They suggested that in order for weekly work plans to be effective, only quality assignments (which meet specific quality requirements for definition, soundness, sequence, size, and learning) should be produced. They argued that the key to efficiency is shielding task execution so that tasks only start when precedent tasks have been completed, and all the resources are available. By making only quality assignments managers can both reduce costs through increased efficiency and reduce durations by eliminating uncertainty. In order that resource utilisation is not reduced owing to delays in task commencement due to shielding, managers are expected to build up buffer stocks of quality assignments off the critical path, to which under-loaded resources can be allocated. The approach is called last planner because making quality assignments is the last stage in the project planning process. The planning horizon is typically one week, and the decision-making process is delegated down to the level of first line supervision.

Figure 2.1 illustrates the sequence of actions that needs to be taken by site foreman/line manager in construction stage, and the use of weekly work plans, which they suggest are the most common form of "commitment plans" in construction.

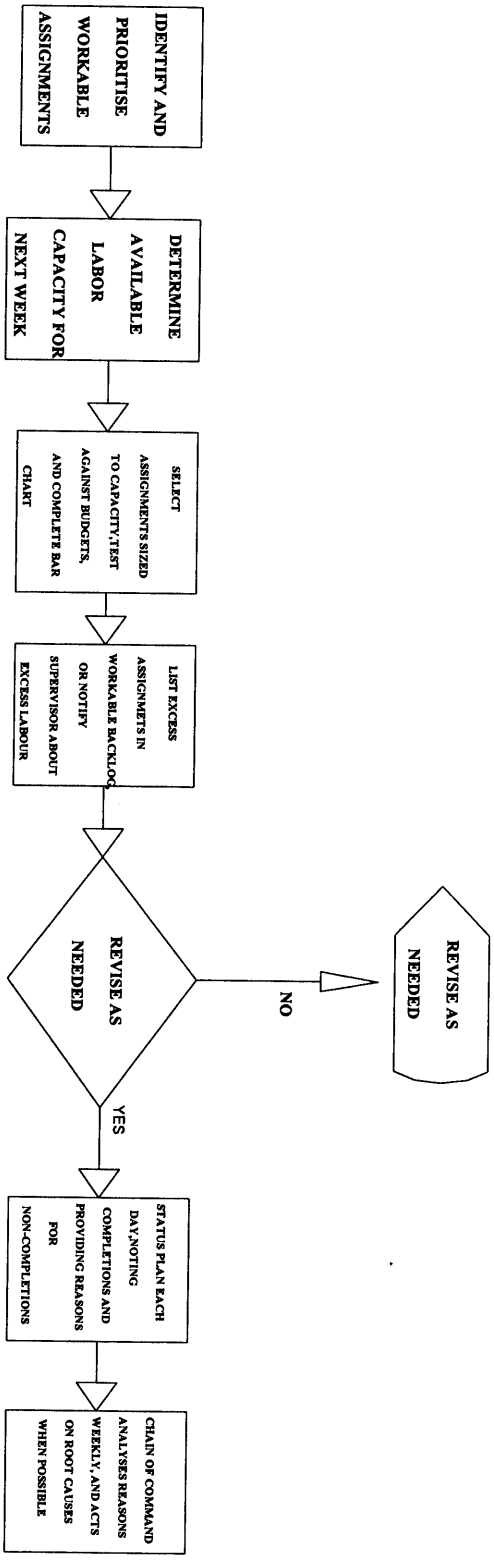



Figure 2.1: Line manager/Site foreman weekly work planning procedure

Source: Ballard and Howell (1998)

## 2.4 The use of Computer Software for Construction Planning.

Application of computer graphics to construction planning is now widely used as tools for visualisation of construction projects to help planners when considering the future implications of their decisions. This approach helps to match the efforts of planners who have to work at the activity level. The strategy is based on the use of virtual reality (VR) technology to support practitioners to plan and visualise their plans in a near reality sense. (Kumi and Retik, 1997)

### 2.4.1 Critical Perth Method (CPM)

The essence of the CPM is to array graphically all the different tasks in temporal sequence, forming a network of task dependencies; it is essentially "a method of thinking and also a method of presenting information". The most commonly used tool for graphing such arrays is the precedence method (activity on the node) because it is easier to use in computer-based applications.

Today, PC applications such as MS Project and Primavera allow calculations to be done instantly, and options to be evaluated effortlessly. Arguably, it was during the 1990s that the true potential of CPM as a project management tool has begun to be realised. A fundamental assumption of the method is that task durations are known accurately to at least the planning unit used for the network (weeks, days, and hours) - the method is deterministic in allowing a single optimal solution. CPM is therefore most commonly used for execution on site. (Winch, 2002)

### 2.4.2 Program Evaluation Review Technique (PERT)

PERT is a quantitative management tool used for conducting project-network analyses. It is a probabilistic method which offers a solution to CPM from the problem of data being less reliable due to task objectives being uncertain, by accepting that task durations are uncertain. It allows task durations to be

estimated as three values - most likely duration, worst case duration and best case duration. The distribution between these three estimates for a task is assumed to a beta distribution, and therefore a probability of achieving the planned duration of the project as a whole can be calculated. (Winch, 2002)

### 2.4.3 Monte Carlo Simulations

Monte Carlo simulation techniques take the probabilistic approach described above further, by generating the distributions of durations of tasks randomly. This is done by providing two estimates - a worst case and a best case duration - and then randomly allocating either one or the other to each task through a large number of calculation cycles. This simulation produces a normal distribution of the probability of a task or the whole project (last task in the network) being completed on a particular date. A cumulative curve of the distribution can be used to identify the probability of the project being completed on or before a specified date. However, probabilistic methods are not very useful for construction planners because the results are normally difficult to interpret, they are also more demanding of computational resources, and no additional information is provided by the technique. Deterministic CPM therefore remains the standard practice of most construction planners (Winch, 2002).

### 2.4.4 Four Dimension Computer Aided Design (4D CAD)

There is an increasing trend of using 4D CAD as a tool to assist the preparation of construction project plans. There are various software packages which have been developed for this purpose. However, because most of these software concentrate on the utilization of 4D CAD as a visualization tool rather than something that can be used for analytical purposes, the simulations are being linked with other technologies used by the construction industry in order to improve the analytical power of 4D CAD.

Those who support the idea of using this technology (such as Heesom and Mahdjoubi, 2004) suggests that the use of 4D CAD has a significant potential for the construction industry. They indicate that 4D simulations can have a positive impact on both pre-construction and the construction stages, whilst

having the power to assist planners in producing efficient planned projects by allowing them to see how their plan will evolve. In addition, 4D technology enables planners to predict potential problems at the construction stage, which could have considerable costs and time implications. Where 4D technology has been embraced, direct savings and an increase in productivity has been seen.

Koo et al. (1998) also demonstrated that 4D could assist the identification of problems that would normally be overlooked in a traditional schedule representation, such as bar charts and network formats. Using 4D technology allowed relatively inexperienced construction planners to identify problems that can be neglected by experienced planners in the traditional schedule formats. This analytical capability has been further exploited by allowing construction-planning students to visualize and analyse a complete construction schedule prior to construction to assess the suitability of a construction plan (Koo and Fischer, 2000; Jaafari et al., 2001).

There seem to be enough evidence to support the idea that the use of computer technology can contribute to the cost efficiency of construction planning by providing considerable savings on construction projects. This can be achieved by identifying problems prior to construction and avoiding re-work during the project. It is important though to consider the costs that are involved in purchasing, maintaining, and training the personnel to use this technology. The balance has to be struck also between the need of using the technology and the costs involved, before deciding whether there is saving to be made considering the size and other economical factors of the project. It is also important to be aware of the limit that these tools can aid a construction planner. Kartam and Levitt (1990) cautioned that the network-based tools such as CPM and PERT algorithms can help in analysing a plan, not in generating it. This means the definition of activities and their predecessors must be provided to such systems by a human planner.

## 2.5 How Planners do their work

Before a construction planner is able to commence the complex operation of producing a detailed plan of works for a construction project, guidelines have to be established concerning the overall objectives that the planning process is expected to achieve. These objectives must be clearly determined at management level and confirmed to the planner before programming operations start. Smith and Woolven, (1991) suggests that the planning brief may have arrangements such as:

- To achieve the earliest completion date
- To fit within start and finish dates pre-determined in the contract documentation
- To match a limitation imposed by the non-availability of a particular resource.

### 2.5.1 The earliest completion date

Sometimes a construction planner is faced with a situation where he have to produce a programme to arrive at the most rapid completion of the works, in order to allow the project to be handed-over to the client at the earliest possible date. Smith and Woolven, (1991) suggest that when this happens, the planner's task will then involve determining the critical path and examining all available methods to reduce its duration. He will have to consider increasing the levels of labour and plant resources utilised and increasing the number of working hours and developing methods of fast-track construction. In this situation, optimisation in the use of resources becomes not a leading criteria and cost optimisation has to be sacrificed for speed. Additional costs and risks created by this planning brief will need to be identified and reported to management, so that a decision can be taken whether the rates to be used and the risks involved are justified to tender for the project.

### 2.5.2 Pre-determined start and finish dates

Often the overall duration for a project is determined by requirements outside of the planning process. This may happen when a client or his consultants have a particular need for a critical completion date (or series of dates) to be achieved. This can relate for example to the commencement of a manufacturing process or a retail outlet, or to the need to vacate existing premises by a certain date. Start dates may be established by the availability of sites being determined by the conclusion of land ownership transfer. In this kind of situation, it is the task of a construction project planner to devise a programme which meets these pre-determined requirements. This is normally carried out by producing the optimum programme period, which is then varied by adjusting resources or methods in order to match the duration required. In this way, variances from the optimum programme are clearly established and the risks identified. (Smith and Woolven, 1991)

### 2.5.3 Limitations imposed by non-availability of resources

A high demand in the industry or the individual circumstances of a firm, may lead to a situation where the planning brief needs to acknowledge certain restraints which will influence the programme. These restraints may be shortages in the availability of staff, labour, sub-contractors, materials, plant or even capital. Kelsey et al (2001) adds to the list of these restraints, what he called "constrainers"; the external actors who can block certain process, example those that the project encroaches on their land rights or the highway management authority. The planner will need to reflect all these factors into the preparation of all programmes.

## 2.6 By-products of planning process

Apart from the construction programme, there is a wide range of other documents in general use, which is prepared as a by-product of detailed planning. The preparation of these documents is very closely associated with

planning, to the extent that it is normally taken as a responsibility of a construction planner to prepare them. Kelsey et al (2002) suggests that the method statement and programme that the planners produce at pre-tender planning, add value by identifying areas of significant risks to which they will be exposed if they decide to undertake the project.

### 2.6.1 Method statements

Method statements are documents describing how a project, or part of a project will be carried out. They are sometimes produced by all parties, but when they are produced by a contractor they are normally are detailed. Method statements have several uses, including communicating with other parties and developing internal estimates. Detailed method statements are very useful and they are normally used for developing a safe system of working in order to achieve a specified quality. Depending on their function, method statements may contain amongst other things, items such as a plan of work for the project, a list of plant and equipment to be used, description of the construction process, and phasing diagrams showing the proposed status of the project at various times and stages of construction. (Mawdesley et al, 1997).

## 2.7 Coordination between planner, estimator, and other actors

Because it is unlikely that the planner will have all the knowledge and/or time required, it is essential that the planner constantly liaises with estimators, production manager, plant managers, site staff, sub-contractors, suppliers and all other actors that their work affects, or will be affected by the plan, and secure their commitment to the programme during its preparation, as well as thereafter. Close co-operation between estimator and planner is particularly essential to ensure that the contractor's estimate is properly prepared, and that it is coherent. It is also important that the estimate must take account of methods of construction and all circumstances which will affect the execution of the work. (Mawdesley et al, 1997)

As mentioned earlier in this chapter, construction planning and the process of cost estimate are carried out in parallel in order to reach a realistic tender sum. The estimator normally assists in the planning process by selecting manpower, materials, plant and equipment that will lead to realistic unit rates and prices. There is normally consultation between construction planner and estimator over each trade involved in the work being estimated. Alternative methods of work, alternative materials, and relationships between plant and labour, can all be assessed in terms of cost and time. It is the characteristics of a particular contract and the requirements of the planning brief which will determine which of these methods and alternatives are chosen, and therefore, the cost. In order to arrive at the total net cost of construction accurately, the estimator will have to cost certain sections of a tender programme based on time. This is particularly true for parts of the preliminaries bill, site and head office overhead costs and the assessment of attendance on sub-contractors. Kelsey et al (2001) suggests that the benefits of this co-operation and commitment are felt from the pre-tender stage, through the construction stages, to the settlement of the final account.

## 2.8 Summary

This chapter carried out a literature review with respect to how construction planning is conducted. Firstly, the terms that are normally confused were defined. The stages of planning were then explained in detail, including the objective of planning in each stage and the issue of the last planner. General procedures of how construction planning is carried out were explained. The chapter covered the issues of how planners coordinate their work with other actors in planning process, and finally it examined the use of computer software in construction planning.

# CHAPTER – 3
# Investigation of the Problem

CHAPTER 3
**Investigation of the Problem**

## 3.0 Introduction

Having looked at what is construction project planning in the previous chapter, this chapter will examine the benefits and costs of construction project planning. The chapter begins by looking at the advantages of CPP and proceeds to examine the cost of carrying out planning. The costs are viewed in terms of financial costs and commitment. Finally, the chapter looks on the effectiveness of resources allocation; and what determines the limit of resources to be allocated in planning activities.

## 3.1 Advantages of planning

There are many advantages of carrying out construction planning, some of the general ones such as improving project performance are already mentioned on introduction chapter. Other benefits of construction planning including:

- Understanding the risk and uncertainties involved in the project at pre-tender stage, so as to make an informed decision on whether to tender or not, and what rates to be used, if a decision to tender is reached by the senior management.

- Avoiding un-economical way of carrying out activities, such as renting machineries that remains on site for several days, while it was actually needed for few days.

- Avoiding re-works at construction stage, which normally results on a budget overrun.

There are several ways that a lack or in-effectiveness of construction planning can cause re-works. Figure 3.1 below provide a perfect example on how this can happen. The picture display a ceiling of staircase which had to be grinded in order for the electrical sub-contractor to carry out wiring works for ceiling light. The (minor) re-works in this particular example was plastering, painting the under-coat, and applying stucco.

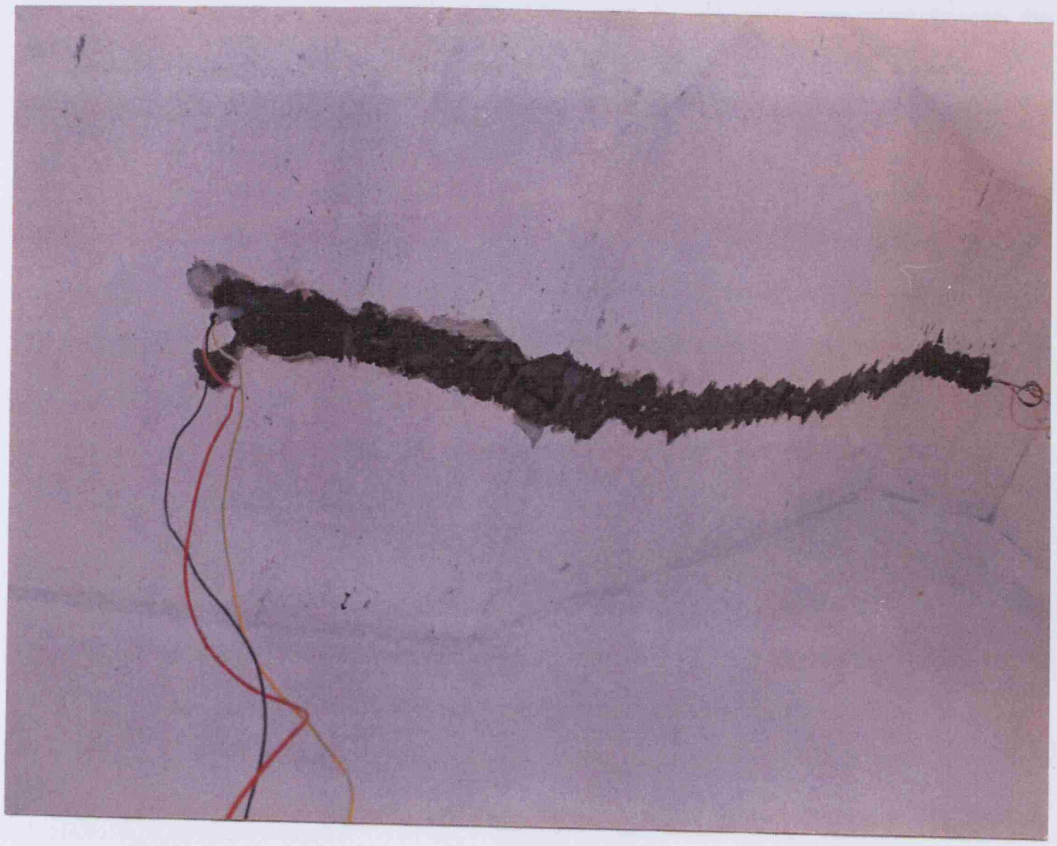


Figure 3.1: Example of re-works caused by in-effective construction planning.
Source: Khamis Ali - ZSTC Project, Zanzibar.

In his study, Callahan (1992) indicated that on average, projects with poor planning can cost as much as 50% more than those with reasonable planning. He also suggested that "exceptional planning" effort can yield as much as 40% savings over a "reasonable planning". Average or reasonable planning means the effort involved is just enough to understand the risks, as explained above. Exceptional planning means a lot of effort is allocated in the planning activities and the level of detail of a plan is very high. This is more likely to happen in post-tender stage where a contractor is already awarded a contract, and he knows therefore that the effort he put on planning will yield benefit to him as well as his client.

A study carried out in Britain by Building Cost Information Service (BCIS, 1988) discovered that 47% of projects exceed their planned cost and 71% of projects overrun their planned time.

Khalaf (2004) indicates that cost overruns in construction projects can be broadly classified in terms of its occurrence as a result of:

- Management decisions.
- Inaccurate or unrealistic initial price estimates.
- Unforeseeable events.

It can be easily concluded that all of the above are directly related to construction planning. Management depends on planning outcomes at pre-tender stage, to decide whether the profit margins are commensurate with company's policies or not, so any decision that the management will take, will partly depend on the planning work that was carried out.

Unrealistic initial price estimate is caused by a planner not knowing for example, how many days will the tower crane be hired and located on site and when it will not be needed, and therefore standing idle on site. This example is a direct result of uncertainty involved in the proposed sequences of activities on site, which is a by-product of planning. Unforeseeable events may be caused by factors such as the complexity of a project, location, political factors, and other factors such as "force majeure?" But inadequate planning can also play a big part. Inexperienced construction planner for example, can not foresee as far as experienced one can. Winch (2002) suggests that budget overrun[4] is not simply the result of bad estimating and that there are other "dynamics" such as inadequate planning that causes it to happen.

Having looked on the benefit of planning in construction, we can conclude that although planning does not guarantee project success, lack of planning or inadequate planning will probably guarantee failure.

[4] He defines overrun as excluding any change in the project mission

## 3.2 The cost of planning

If planning has all those advantages, one might ask, why contractors would engage themselves in a project without carrying out proper planning? Again the simple answer to that question is that because CPP has its costs.

The costs of carrying out construction planning can be divided in two groups:

- Financial
- Commitment

**3.2.1 Financial** - these are the actual cost that a main contractor will incur for increasing the planning efforts in terms of human recourses allocated to carry out planning. Skitmore (1980) indicated in his simulation tests that profit margins of main contractors should increase, if the estimating accuracy is improved. However, he emphasise that those tests did not take into consideration allowances for the additional costs of improving estimating accuracy. He advised therefore that any further simulations should establish an optimum level of estimating accuracy in proportion to the contract size. We have used this example because first estimating and planning has a direct link at pre-tender stage, and secondly to show that the more accurate or adequate the activity is carried out, the more costs will be incurred.

We have discussed in previous chapters about the link between inadequate planning and project complexity and size, and we have discussed above how inaccuracy of initial estimate is related to construction planning. Significant cost can also be incurred by using computer software as aiding tools to construction planners (see chapter two). The costs will generally be two-fold, the cost of buying and maintaining computers and the software, and the cost of training construction planners and other actors to use it.

**3.2.2 Commitment** - there is an argument that once you commit yourself with a plan, you are obliged to follow it. This argument refers to the way a contractor have indicated in the plan, how he will approach the project. This happens at pre-tender stage where main contractors are normally required to submit planning elements such as method statement and a programme as part of

selection criteria to be used by client or their representatives. If a contractor has shown on those elements of planning that he intend to use certain kind of technology or sequences of carrying out activities, then he will be committed. The reason for this commitment is that it may be the approach or technology he have put forward at pre-tender stage, was a deciding factor for winning the contract. A point to note is that planning is expensive because those involved have to spend time thinking about it, use resources to do it, and spend yet more time to re-check it. But as discussed earlier that not having planning or doing it inadequately, is even more expensive.

### 3.3 Resources allocation

The question of how resources should be allocated in order to achieve success in project performance is a complex one. Faniran et al (1999) indicates that it is an important issue because it will help the top management of construction firms to determine the investment required to achieve cost effectiveness in planning activities of projects, and within the firms.

Firdman (1991) proposed the relationships to demonstrate the value of investing the correct amount of planning effort into a project. Below is the graph that illustrates his proposal.

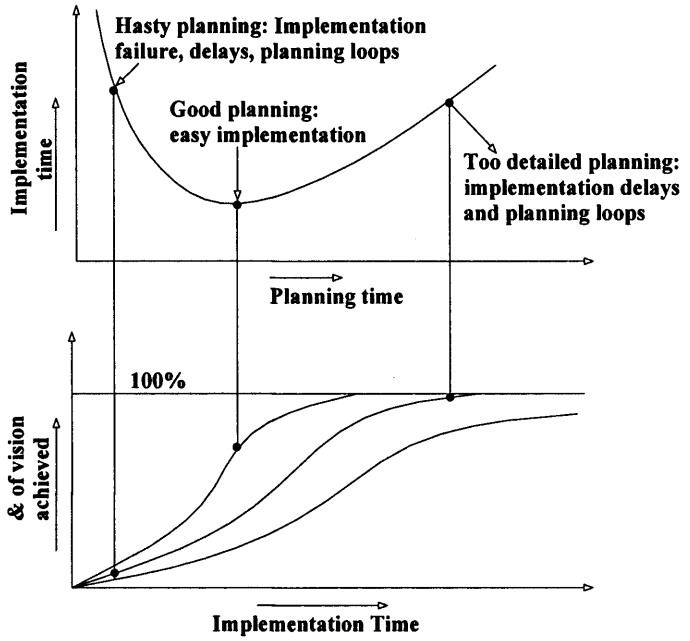



Figure 3.2: Correct planning

Source: Firdman, (1991)

The graph above shows the value of investing the correct amount of planning effort into a project. Those relationships shown indicate that too little planning effort will normally result into failure of implementation of project activities, project delays, and re-works. There is also a high probability that the project will not achieve its objectives. Conversely, when the correct amount of planning effort is invested, the project implementation time is optimised, and there is a high probability that the project will achieve its intended objectives. His study also indicates that planning effort beyond the optimal level will result on the high probability of the project achieving its intended objectives. However, the extra effort is essentially wasted because of the implementation delays that inevitably arise, due to additional time required to complete the planning and the increasing number of planning loops that occur, as planners plan and re-plan minute project details.

Neale and Neale (1989) also carried out a research in which they came up with a proposal about relationship between project cost and planning input. This proposal is shown in figure 3.3 below.

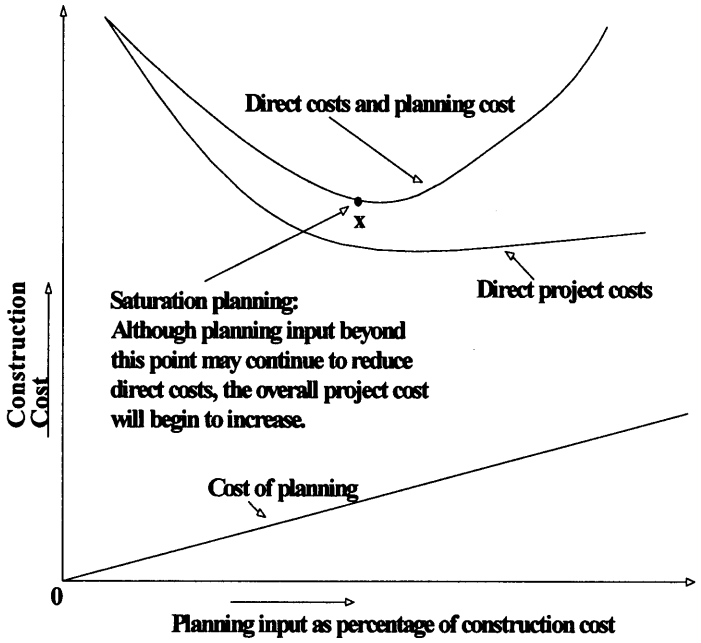



Figure 3.3: Saturation Planning

Source: Neale and Neale, (1989)

The graph indicates that as planning input increases, from 0 to (X) %, project costs are reduced. However, as the planning input goes beyond (X)%, project costs begins to increase. He described the low point (X ) of the total cost curve as the saturation point of planning, beyond which further spending on planning does not achieve any savings in project cost, but merely adds to the overhead and therefore increases the overall project cost.

In another study carried out by Faniran et al (1999), they concluded that investing in construction planning process beyond an optical point, increases the probability of poor project cost performance, and is therefore not likely to be cost-effective.

The question still remains, how can we determine the values of "optimal planning inputs?" This question has to take into consideration that construction projects differ widely depending on factors such as size, complexity, procurement methods, and environment which the project is executed. A good and simple example is that the planning of a "construction" of a building will differ widely with a planning of "demolition" of a building of a similar size, structure, or age, which is located at the same site. This is because the latter has

more uncertainty on how it will react while the former may have less uncertainty due to repetition, past records, and implicit knowledge of those involved in the project.

### 3.4 Clients

The advantage of CPP to clients and their representatives is that it helps to put together the contract documents which contain a specification of the planning that should be done and communicated to the client. Other benefits of planning are that it can be used by client as a target for the contractors work, and it allows budgets to be produced rapidly and as accurately as possible.

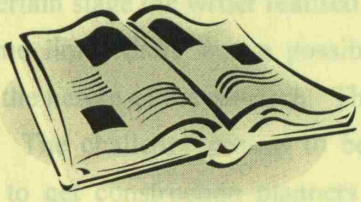
Mawdesley (1997) suggests that apart from contractors' planning, clients should also undertake their own planning. He mentioned other benefits of that type of planning as:

- A detailed programme of work will enable variations to be evaluated at the design stage in a sensible manner
- It will help to plan clients and consultants work in order to determine the resources requirements in terms of supervision for the contractor and the production of their own work, such as design works.

### 3.5 Reducing uncertainty

Uncertainty is a fact of life in construction projects. Construction project planning helps to reduce the uncertainty in many respects by examining in advance the level of risk and uncertainty involved in the project. Winch and Kelsey (2005) concludes in their paper that construction project planning add value for the contractor by ensuring that estimating and tendering are based on a clear understanding of the methods, time, and space required to carry out the task for each building contract and the corresponding risks involved.

# CHAPTER 4
# Methodology



# CHAPTER 4

## Methodology of data gathering and analysis

### 4.0 Introduction

The basis of this study is literature review and gathering of primary data to investigate the effectiveness of resources allocation in construction planning. Although extensive literature regarding construction planning exists in recent journal articles, very few text books exist that are not older than ten years. Although that may not be a significant problem considering the slow pace of changes in construction industry, it is the reason behind the extensive use of journal articles and research papers in literature review of this study.

### 4.1 Method for primary data collection and the changes that was made.

As mentioned earlier in the introduction chapter, the initial method intended for gathering primary data was to conduct interviews with experienced construction planners in UK. At a certain stage the writer realised that the response was slow and considering the time limit, there was a possibility that the data will be unrepresentative, given the nature of the research. This was taken as a challenge rather than a problem. The challenge proved to be beneficial as a new idea developed; which was to get construction planners from different country to participate in this study. This helped to increase the amount of primary data while at the same time enabled the study to examine how planning activities are carried out in another country. A different version of a questionnaire was prepared using exactly the same questions, but the questions were tightened up to enable the respondents to understand them more clearly, and to make the analysis of the collected data easy. Some of these questionnaires were sent to UK contractors who did not agree to be interviewed, but who were willing to participate by completing questionnaires. Some specific instructions were added to questionnaires that were sent to Dubai, United Arab Emirates, to make sure that they were filled by the targeted personnel and by the right size of construction firms. Also some questions were added to establish in which country the firm is registered (see appendix 2).

The decision to expand the research geographically increased the work-load. To the writer. However, the benefit it created in understanding the research problem has offset the difficulties by providing opportunity to be closer to finding a solution. After intensive literature review, one question that was lingering into the writer's mind was "why don't all the tendering contractors select a consultant to prepare the planning that is required for tendering purposes, and a contractor who win the contract pay the consultant?. This seem to be cost effective approach as it avoids all contractors doing the same thing, using resources separately, and probably come up with something which is similar. After questionnaires started to arrive from Dubai, the answers to some of the questions indicated that something was different between how the planning is carried out in UK and Dubai. Eventually it became clear that the idea is already being used in Dubai, although not exactly the same way as proposed by the writer, but in a similar way. Finally one of the survey questionnaire had a separate explanation attached to it, which explained that most large contracts in Dubai are managed by Project Management Consultants and that in such cases the planning is carried out by them as part of their overall project duties.

These questionnaires were then used to investigate this new emerged hypotheses. For example if construction project planning is carried out by consultants, what is their general opinion regarding the improvement of construction planning effectiveness? More importantly, what is the difference between planning which is carried out by contractors and that which is carried out by consultants? Is there a lesson to be learned?

The decision was then taken to analyse those questionnaires from Dubai and UK separately so that they can be compared and contrasted at a later stage, within data analysis chapter.

## 4.2 The analysis of data

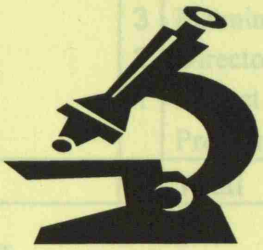
The data analysis process begins from the general questions and proceeds throughout the questionnaire. However, the analysis some times uses different relevant questions without following the number sequence in order to support the relevancy of a point.

Graphs and pie charts are used to display the result of the analysis, most of them they use mean values or percentages because the size of UK and Dubai sample is different. The writer feels that by using the score figures to compare the two samples would be misleading. The score is therefore used only when individual projects are discussed as an example. The "Survey data sheet" is used to collate all questionnaires in order make the analysis easy. In the survey data sheet, only answers provided from the project planners are shown, this means for example if there were five choices to choose from the answer which was asked, and all the planners within a sample chose only two of those, then the remaining three choices will not appear in the survey data sheet. The survey data sheet and two sets of questionnaires are provided in appendix 1 and 2 respectively. It is important to stress at this point that although the analysis of primary data uses mean values and percentages when comparing the two samples of UK and Dubai, the samples are not statistically significant because of its nature.

## 4.3 Summary

This chapter began by indicating the availability of different data sources that are used for this report. It proceeded by explaining the original intended method of primary data collection, the changes that was made, and the benefits those changes created. Finally, the chapter explained the method of data analyses which was used and the reason for using that method.

# CHAPTER 5
# Research Findings and Analysis



# CHAPTER 5

## Research Findings and Analysis

### 5.0 Introduction

All field data collected from interviews conducted in UK and Questionnaires surveys from Dubai are combined together in what we have called survey data sheet (appendix 1). This chapter analyses the findings from the survey data sheet. It looks at the significance of the findings in terms of the objectives of the research by going through all the questions. It is important to stress that although the analysis uses mean values and percentages when comparing the two samples of UK and Dubai, the samples are not statistically significant .

### 5.1 Background of interviewees

| Position of Planners | | | |
|---|---|---|---|
| UK sample | | Dubai sample | |
| Senior Planner | 3 | Planning manager | 1 |
| Planning manager | 2 | Director | 1 |
| No answer | 1 | Project Manager | 5 |
| | | Programme Director | 1 |
| **Total** | **6** | **Total** | **8** |

Table 5.1: Position of Planners

| Formal Education Attainment | | | |
|---|---|---|---|
| UK sample | | Dubai sample | |
| BSc. | 1 | MSc. | 4 |
| A - Level | 4 | BA(Architecture) | 1 |
| No answer | 1 | BSc. | 3 |
| **Total** | **6** | **Total** | **8** |

Table 5.2: Formal Education Attainment of Planners

The purpose of question 1-3 was to establish the background of the interviewees. The picture which emerge is that Dubai planners appear to be highly educated compared to UK planners (table 5.2). However, it is also

interesting to note that the data indicates that UK planners are highly experienced compared to Dubai planners (table 5.3). This might have something to do with the emerging University courses that deal specifically with planning, or that UK contractors perceive experience as more significant for planning than the level of education. However, as mentioned earlier that because of the sample size, this could be just a coincidence and it may not have statistical significance.

| Experience of the Planners | | | |
|---|---|---|---|
| UK sample | | Dubai sample | |
| 12-15 years | 1 | 4-7 years | 2 |
| 20-23 years | 1 | 8-11 years | 1 |
| 24-27 years | 1 | 12-15years | 2 |
| 40-43 years | 2 | 16-19 years | 1 |
| No answer | 1 | 20-23 years | 2 |
| **Total** | **6** | **Total** | **8** |

Table 5.3: Experience of the planners.

| Project Contract Value | | | | |
|---|---|---|---|---|
| UK Projects - millions £ | | Dubai Projects - millions Dirhams | | Eqvlnt £ |
| A | 75 | A | 375 | 55 |
| B | 600 | B | 700 | 103 |
| C | 28 | C | 1,500 | 215 |
| D | — | D | 649 | 220.6 |
| E | 70 | E | 828 | 121.7 |
| F | 15 | F | 185 | 27.2 |
| | | G | 160 | 23.5 |
| | | H | 1,999 | 294 |

Table 5.4: Contract value of projects

## 5.2 Procurement Methods

A mixture of different procurement methods is used for UK and Dubai projects. The data indicate that out of eight Dubai projects, there are ten procurement methods used (table 5.5). This is because the project management consultants who answered the Dubai survey questionnaires manage a large project divided in several divisions, and some of those divisions there are more than one procurement method used. The study indicates that from the fourteen projects of both samples, there is a mixture of six procurement methods used. The significance of this finding forces us to be cautious regarding respondents perceptions to planning, in terms of how it is conducted and how they think it should, taking into consideration all areas investigated for the purpose of achieving the objective of this research. This is because different procurement methods have different characteristics in terms of how planning is carried out, the amount of resources used, and hence the difference on expenditure used to different stages of planning. In his research, Kelsey (2000) suggested that integration is easy when using Design and Build (D&B) procurement method or construction management. This is because the planners have the benefit of having the design in-house, and therefore they are more likely to be consulted on constructability issues. Another benefit is that they can follow-on the planning process at later stages. However, it is important to be clear that which ever type of procurement method used in projects, construction planning is un-avoidable. This is the case even in a situation where partnering arrangements are used, and therefore competitive tendering is not necessary.

| Procurement methods | | | |
|---|---|---|---|
| UK sample | | Dubai sample | |
| Traditional | 2 | Traditional | 6 |
| Design and build | 2 | Design and build | 1 |
| Two-stage tender client design | 1 | Construction management | 2 |
| No answer | 1 | Management contracting | 1 |
| | | Fixed price lump sum | 1 |
| **Total** | **6** | **Total** | **10** |

Table 5.5 Procurement methods used in both samples

## 5.3 Cost effectiveness of planning - Dubai projects

The link between a lack of cost effectiveness of planning and its contribution to project cost and time overrun is examined by question 4-14. The questions investigates the actual percentage distribution of planning to the surveyed projects, and what the planers of those projects thinks is the right amount which should be distributed. The purpose of these questions was to establish whether there is a need for change on planning effort at different stages of planning. Before we examine the whole samples, we will first take two examples of Dubai projects. The survey indicates that project A of Dubai has a 13% budget overrun and 39.1% time overrun. Despite those findings, the planner does not believe that these problems are caused by in-effectiveness of planning (see question 9). Similarly, project C from Dubai has a 20% budget overrun and 25% time overrun, but also the planner does not believe that these problems are caused by in-effectiveness of planning. However, both planners of the above projects would prefer an increase of 100% at pre-tender stage and 50% at post tender stage (project A). Project C planner believes that planning should be increased from 40-80% at pre-tender stage. (appendix 1 question 12-14).

The findings also indicates that almost all Dubai planners, their reason for proposing changes in planning percentage distribution in different stages (Question 15) is to make sure that planning is as complete as possible before construction work begins, so as to avoid any unnecessary changes to a plan, which usually causes time and cost overrun. This is natural considering that they are clients' representative and they would therefore want to achieve those two project success criteria.

Figure 5.1 below indicates the mean values of actual and preferred planning for all Dubai projects, and figure 5.2 shows the preferred percentage changes of planning effort attributed to different stages of planning for all Dubai projects.

Although the mean values and percentages for all projects do not show a great range of changes like the example used above, the general trend is still there; that they prefer planning effort to be increased at pre-tender stage. Most of the Dubai planners have similar reasons; to reduce changes of a plan during construction stage, which they both admit that it usually causes time and cost overruns.

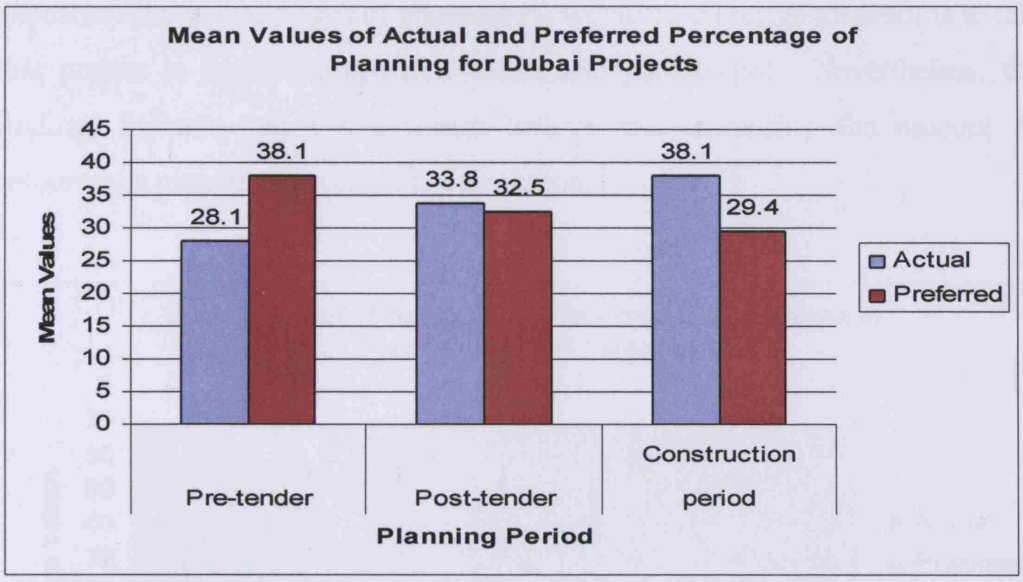



Figure 5.1: Mean values of planning for all Dubai projects.

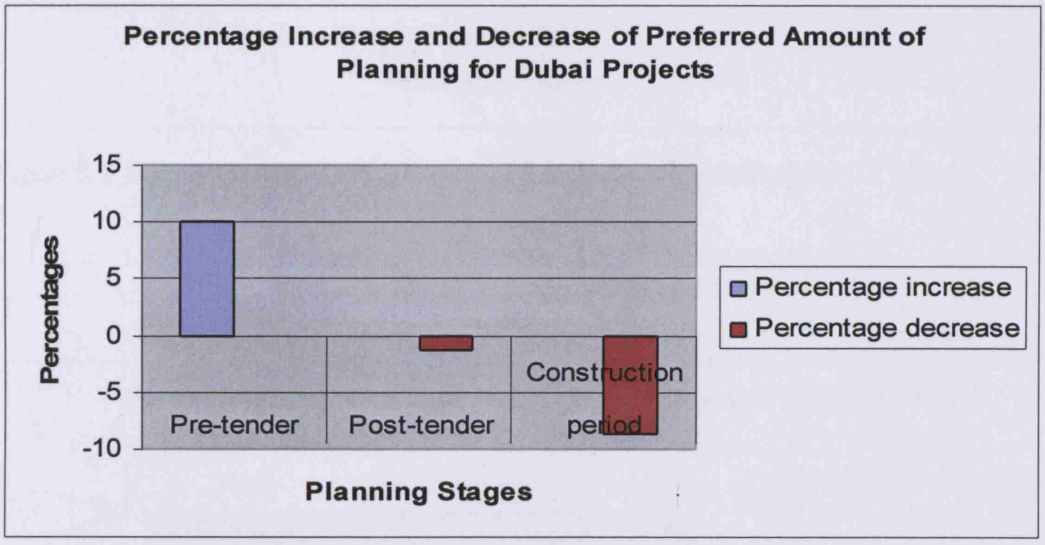



Figure 5.2: The preferred percentage changes

### 5.3.1 Cost effectiveness of planning - UK Projects

The evidence from the data indicates that UK construction planners would like planning resources to increase only by 4% at pre-tender stage, compared to 10% by Dubai planners (Figure 5.3 and 5.4). It has to be stressed at this point that for this specific question, the analysis discussed and used in those two figures below is derived from only five out of six projects of UK sample. This is because project F of UK sample is still not yet on site and percentage distribution is

allocated only in two stages of planning. It would be therefore misleading to use that project in investigating mean values and percentages. Nevertheless, the findings indicate that UK planners believe that increasing the amount of resources in planning process is not a solution.

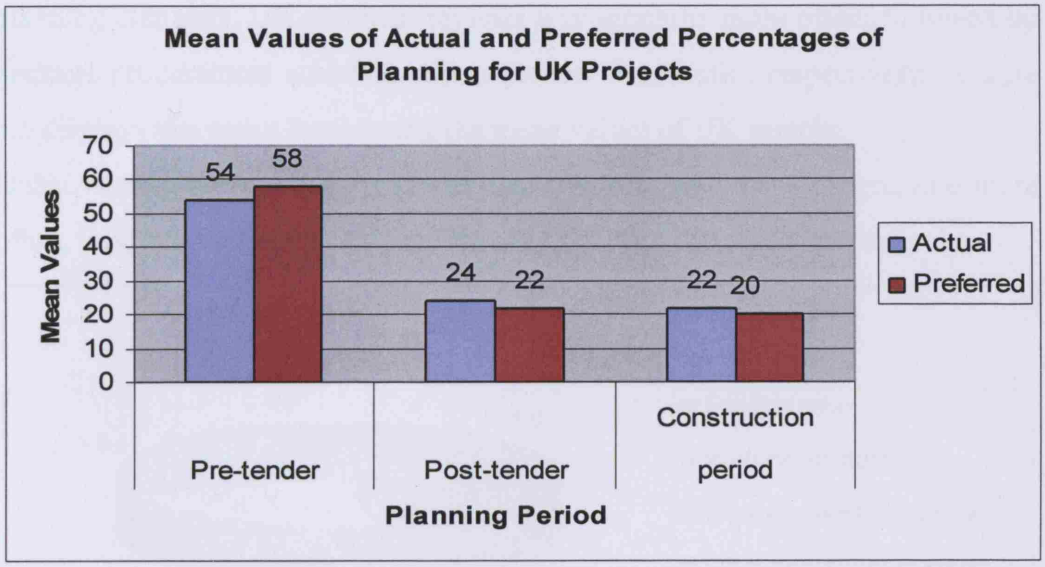



Figure 5.3: Mean values of actual and preferred percentage of planning for UK sample.

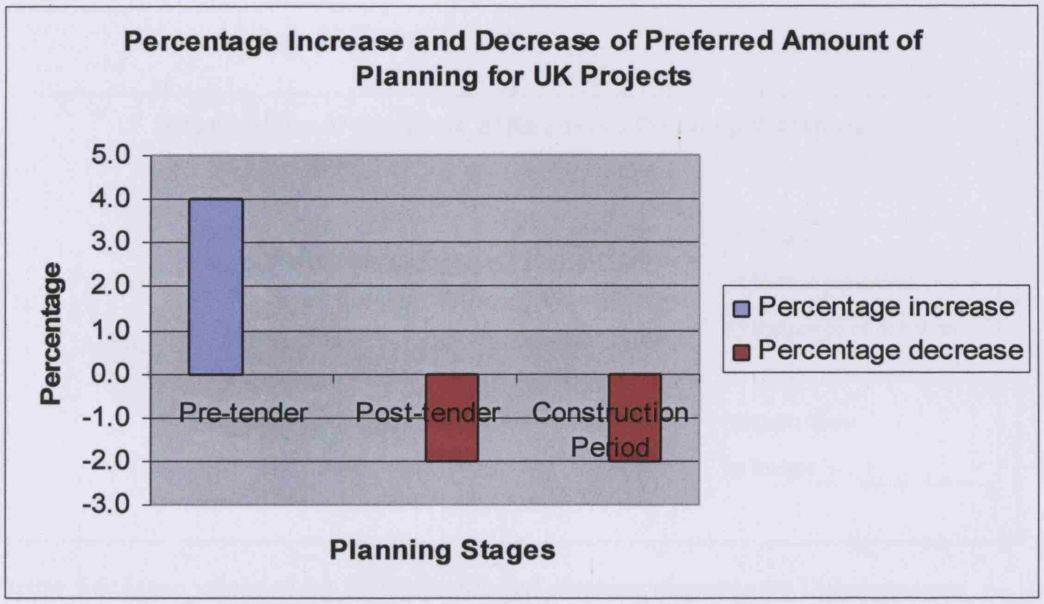



Figure 5.4: The preferred percentage changes of different stages of planning for UK projects.

## 5.4 Planning review process

The purpose of examining how often construction planners review the planning elements (question-11) and at what stage of planning those reviews takes place (question-10) was to investigate the amount of resources consumed to review planning activities in different stages, and to find out what element is perceived to be more important by planners. The investigation indicates that among the planning elements, UK planners reviews a programme more often, followed by package procurement schedule and sequence of activities respectively. Figure 5.5 displays this result by showing the mean values of UK sample.

Dubai sample (Figure 5.6) indicates that planners reviews a programme more often, followed by sequence of activities and method statement respectively.

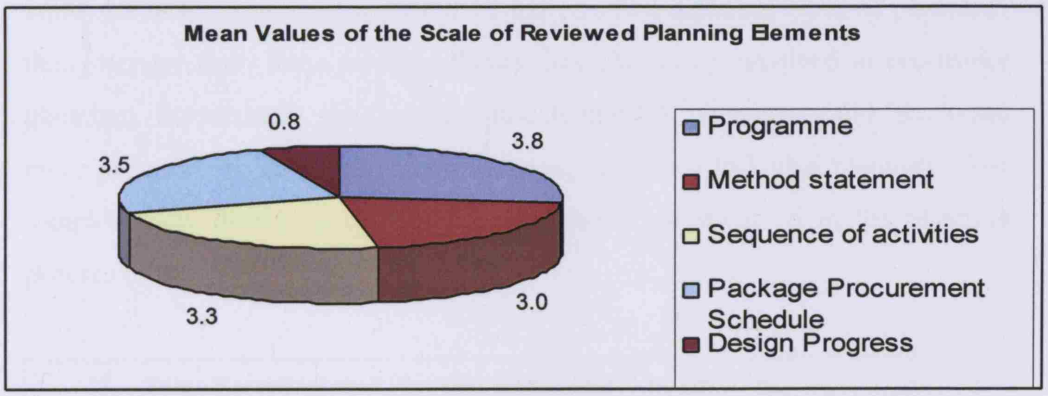



Figure 5.5: Mean values of the scale of reviewed planning elements for UK projects.

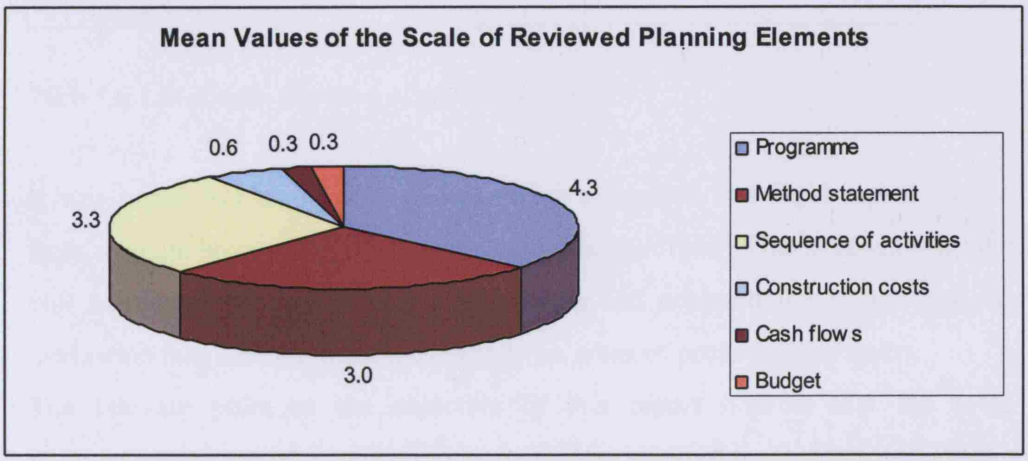



Figure 5.6: Mean values of the scale of reviewed planning elements for Dubai projects

## 5.5 Planning effort in pre-tender stage

In terms of individual participation in UK planning process, planners have the highest score followed by Estimators/Quantity Surveyor (QS). However, this finding should be treated with caution as the work of planners and QS most of the time are un-separated. Apart from preparing sequences of activities, work schedules, and duration estimates, construction planners sometimes prepare cost estimate as part of their duties. For Dubai projects, project managers have the highest score followed by planners and Estimators/QS (Question 16). The reason for this is explained earlier that planning is carried out by project management consultants. However, this finding has to take into consideration that sometimes planners carry out estimating works in addition to their planning duties (Kelsey, 2000). The findings from question 17 indicate two different types of personnel that planners from these samples thinks they should be involved in pre-tender planning. Surprisingly, the findings indicate that UK planners would like to see more personnel to be involved in this stage, compared to Dubai planners. The samples show diverging opinion on who should be involved in the planning process (Table 5.6).

| **Extra Personnel that Planners would like to be Involved** | | | |
|---|---|---|---|
| UK sample | | Dubai sample | |
| 1 | Statutory service personnel | 1 | Short listed contractors |
| 2 | Planning department | 2 | Design consultants |
| 3 | Procurement and contracts | 3 | Client |
| 4 | Project manager | 4 | Site manager |
| 5 | Specialist sub-contractors | | |

Table 5.6: List of extra personnel of the two samples

It was noted that some of the respondents suggested that legal representative from relevant head office department should be involved. This is because he/she will help to review and evaluate agreements and contractual position, and his evaluation may affect the plan, especially on areas of project constrainers.

The relevant point to the objective of this report here is that the more involvement of personnel, the more costs will be incurred by contractors. This

may not be a problem to Dubai planners for the reasons already explained above, but it is a problem for UK planners. Kelsey et al (2000) recommended the involvement of Project managers at an earlier design stage of a project but also cautioned that it will result in extra costs to clients.

### 5.6 Planning effort in Post-tender pre-construction stage

At post-tender stage, a contract is already awarded to a contractor and most likely the completion date is set. The planning carried out at this stage therefore is mainly for the benefit of a contractor. One of the main priorities of the actors involved should be to avoid a change of programme during construction stage, which could have financial consequences especially to a contractor.

The survey shows that Dubai planners would like to see more participants from both, internal and external parties (question 24-27). Head office departments that are usually involved in post-tender planning are five, and yet they would like to see seven more departments to be involved. In contrast, the UK sample shows that eight head office departments are normally involved at the same stage, and none among the six UK planners would like any more departments to be involved. Yet again, this comes to the same conclusion that UK planners might be trying to avoid transaction costs involved in planning, while the Dubai planners they don't have to. The lesson here is that because of the cost involved, contractors may economise the resources required for carrying out a proper planning, and conduct in-efficient planning which will most likely result on financial loss and other complications for the project. This argument is especially relevant at this planning stage, because as explained earlier that the planning that is carried at this stage is more beneficial to a contractor.

### 5.7 Time Factor

At post-tender stage, time factor is very important in order for planners to prepare detailed planning which will not need to be changed unnecessarily. However, this is the stage where a contractor is under pressure from client to start the work on site as soon as possible. The mobilisation period which normally is an average of one month (see chapter two) is used by planners to

carry out the detailed planning necessary for construction period. The Dubai sample shows that six out of eight projects had less than one month at this period, but five out of eight thinks that the time was sufficient to carry out detailed planning necessary for construction stage (question 28-29), and six out of eight agrees that implementation of planning at post-tender pre-construction stage would be conducted better if more planning was carried out in the pre-tender stage. The UK sample varies widely regarding the time between contract award and the start of construction work on site. The findings show that three projects out of four who replied, had 1-2 month and one project had 3-4 months at this period (question 28-30). However, this particular project actually started the site works within one month, but they had to stop because the client did not have a building permit and the contractor was not informed by the client.
The important point to discuss at this point is the significance of different forms of contract. In Dubai, the commonly used form of contract is FIDIC[5], under this form of contract; there is an allowance of twenty eight days for a contractor to submit a detailed construction programme. According to three planners out of eight, this time it is not enough. In the words of project B planer,

> "*The Engineer (Consultant) usually rejects the initial submission as well as a number of iterations on the Programme till an approval is granted. It is important to impose the 28 days duration so that the process of approving the programme get started, but actual approval takes three to six months, on a 24 month Construction Contract*"

According to both surveys, the main concerns for planners are the delays caused by outstanding design information which interferes with this post-tender planning period. The data indicate that the majority of UK and Dubai planners agrees that implementation of planning at post tender pre-construction stage would be conducted better if more planning was carried out in the pre-tender stage (Figure 5.7)

[5] Fédération Internationale Des Ingénieurs-Conseils - French for the International Federation of Consulting Engineers. (http://en.wikipedia.org/wiki/FIDIC)

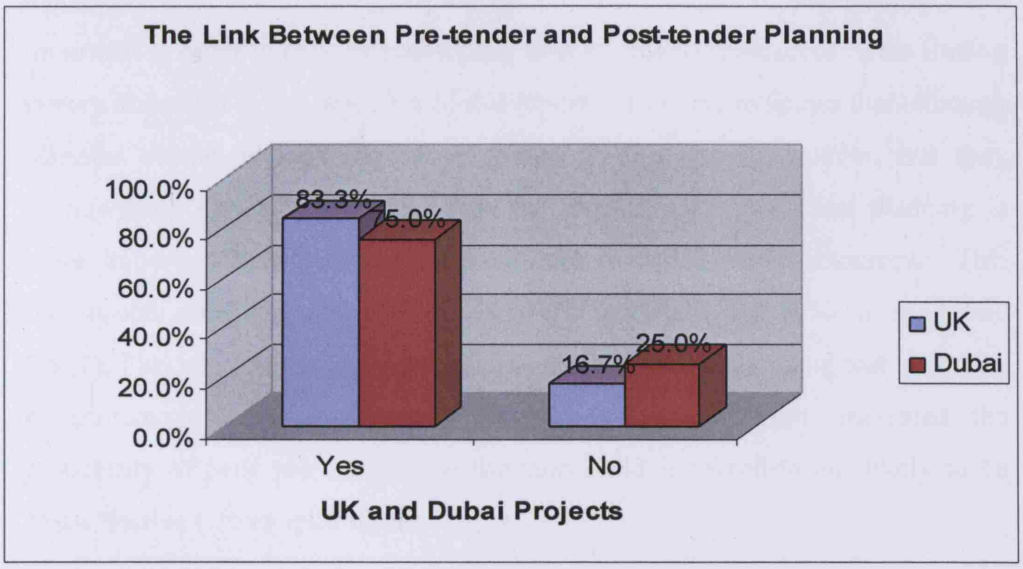



Figure 5.7: The link between pre-tender and post-tender planning stage.

## 5.8 Factors that were considered during pre-tender planning

This is one area which does not have a direct significance to the investigation of cost effectiveness of resources allocation in planning stages. The question (31) was put just to get general understanding regarding what planners consider to be most important factors to consider in pre-construction planning stage (such as human resources and equipments allocation, cash flow constrains from head office, etc) Nevertheless, one point that need to be stressed is that some contractors did mention "other" factors (such as weather) to be considered, which was then included in the survey data sheet, but it is the writer's opinion that there are important factors that was not mentioned such as site constraints, operative shortage, and even world material shortage for very large projects.

## 5.9 Increasing resources or planning time?

The most significant finding from the analysis of the open questions is the issue of increasing resources or time in order to have cost effective planning (question 35-36). Both samples indicate that all planners either strongly agrees or at least agree that increasing expenditure on planning, at post-tender pre-construction stage for the purpose of having a good plan, can be justified by the savings that main contractor will make during construction stage, through to the end of a project. However, both samples also either strongly agrees or at least agree that

increasing time for planning, in any of the three stages of planning is more important in order to have effective plan, than to increase resources. This finding is very important to the objective of this report. It clearly indicates that although planners would like to see more resources in planning process, but they acknowledge that increasing the time for conducting construction planning is more important than increasing expenditure by using more resources. This finding also reflects similar findings of other researchers such as Neale and Neale (1981), Firdman (1991), and Faniran et al (1999), both concluding that investing in construction planning process beyond an optical point, increases the probability of poor project cost performance, and is therefore not likely to be cost-effective (see chapter three).

### 5.10 Improving cost effectiveness of construction planning process

It was necessary to get general comments from construction planners regarding cost effectiveness of planning process. Almost all planners from UK sample indicated that the idea of reducing planning costs at pre-tender planning stage, by tendering contractors to collectively employ a Project Planning Consultant (PPC) as put forward in question 39, either it will not work at all, or it will help only to a certain extent. As indicated in methodology chapter, only the answers provided from surveys is provided in survey data sheet, and therefore analysed in this chapter. The writer wishes to stress that the answers for this general question are all from UK interviews. This might be caused by the fact that in Dubai, planning is not carried out by contractors, and therefore they found the question to be irrelevant. However, the UK respondents have provided good feedback by giving a range of significant comments which are summarised and shown below:

| | |
|---|---|
| I. | Everybody would have a different way of doing work with often complex links between elements of their programme. |
| | |
| II. | Because doing that will result on contractors not having a clear understanding of the project from the beginning, which might cause problems at a later stage of planning. |
| | |
| III. | Because we planners will not have the edge of the project. |
| | |
| IV. | Because each tendering contractor is in competition and programme/method statement should be the primary basis on the tender process. |

Table 5.7: UK Planners comments regarding question 39.

Comment number two and three seem to mean the same thing and they have provided the writer with a completely un-expected reply. Although the answer seems to be obvious, by no means this un-expectedness was caused by the lack of understanding of the planning process by the writer. A senior planner from one of the leading cost consultancy firm in UK believes that the idea will help a lot, and he had this comment regarding the above question:

> "*...Because construction methodology optimal solutions are often common, therefore the idea will help to reduce mistakes by contractors, and to reduce tendering costs in the industry. It will also provide an incentive for contractors to partake and contribute to the betterment of construction project planning*".
> Leon Squire.

However, the above comment should be considered with care as the contributor is a cost consultant who would most likely benefit if such an idea becomes practical

# CHAPTER 6
# Conclusion and Recommendations

# CHAPTER SIX

## Conclusions and Recommendations

### 6.0 Conclusions

The review of literature has indicated that the significance of construction planning in relation to project success is widely recognised by researchers within the construction industry. Planning is un-avoidable in construction even if competitive tendering is abolished altogether, and all projects are procured under partnering arrangements[6]. The point however is how we can provide an outline on how strategies can be formulated to make CPP effective, which is the main objective of this research. The objective originated from several research findings with contrasting conclusions; with some suggesting that effectiveness of CPP can be improved by increasing the amount of resources in planning process, while others conclude that increasing resources beyond optimum point in planning activities may result on an unjustified increase in overall costs of projects, and hence a lack of effectiveness of the planning process. The investigation on how planning effectiveness can be improved was therefore carried out. Respondents from two samples from different contributed very positively and provided comments that if implemented, the effectiveness of construction planning could improve. The second objective was also investigated and its conclusions reflect similar findings of other researchers who have investigated this topic. Perhaps this is the most significant finding from the analysis of the field research. All fourteen planners from the two samples indicated overwhelmingly that increasing resources in planning activities is not a solution, and hence will not result on cost effectiveness of planning, but rather increasing the time of carrying out the planning process is needed. This study indicates that the time factor is the main concern of all planners, and their reasons are provided in survey data sheet (appendix 1).

The research also investigated whether planners acknowledge the fact that apart from planning being a tender requirement for some procurement methods, it also benefits a contractor throughout the period of a project, if it is carried out

[6] See chapter 5 – Procurement Methods.

effectively. The findings indicate that all planners of both samples are aware of this fact.

The new idea of using two different samples was tested. The samples were used so that planning can be examined from two different perspectives; planning which is carried out by consultants, and the one which is carried out by contractors. The decision to use this idea uncovered an important finding; while contractors (in UK sample) use resources for planning activities at pre-construction stage, when there is no certainty of winning the tender, in Dubai planning is carried out by project management or engineering consultants, who are paid by the client as part of their overall duties. It would be interesting to find out what Dubai clients thinks regarding paying for planning, while in other forms of contract the contractors pay for it themselves as part of tendering process. Similarly, one might argue that the UK contractors are actually being paid indirectly by clients for carrying out planning. This is because contractors normally include their tendering costs which include planning costs in their rates mark-up (Gruneberg and Ive, 2000). The question which still remains is how contractors are supposed to recover those costs if they do not win the contract. Perhaps they should be considered as normal transaction costs that are caused by "bounded rationality[7]" and uncertainty as provided by Williamson, (1985).

Regarding the comparison of the two samples of UK and Dubai, the findings of this study indicates that owing to the differences in cultural and geographical conditions, there is no optimal solution as to what type of planning is better compared to the other.

Generally, the picture which emerged from the analysis indicates that it is difficult to come to a single solution or a formula, which can be used as a "panacea" for carrying out construction planning in an effective way. The difficulty is caused by the fact that construction projects are unique and hence they have different levels of complexity. Different projects have different characteristics; they are executed in different way, and they use different procurement methods, in different locations, during different time of the year.

[7] Bounded rationality – refers to the fact that both firms sometimes have to take decisions without possessing all information relevant to their decision making.

What this study has achieved therefore, is to devise a general outline on how this objective can be achieved. Figure 6.1 displays a diagram with those guidelines. The diagram displays the three planning stages on the left column, followed by a middle column with three levels of complexity in each planning stage. The right side column provides general guidance on how effective construction planning can be achieved. The outline model is a summarised general understanding of the writer of this study.

With the current system where main contractors are expected to submit fully-fledged detailed planning on the award of the contract, to be followed by regular reviews in later stages, might not be the most effective way of carrying out construction planning when it involves a highly complex project. In this kind of scenario clients and their representatives should be more flexible and considerate in their tender requirements to allow the planning effort at pre-tender stage to be at minimum level depending on the complexity of the project. A "Rolling wave" approach for carrying out planning of highly complex projects should be considered. (see chapter 2 and figure 6.1 page 50)

Finally it has to be stresses at this point that in-effectiveness of construction planning is not always the fault of planners, but it is rather connected to the issue of complexity and uniqueness of construction projects above. This is summarised rather cleverly by an army General below:

> "*No plan survives first contact with the enemy*".
> Attributed to Von Moltke

In terms of construction planning, this means planners can use all their expertise to foresee how they will approach the project, but when the time of execution comes there may be several unknowns that can force the plan to go under significant reviews and changes.

## 6.1 Recommendations

- The overwhelming concerns of all planners from both samples regarding effectiveness of planning are late design information, and design changes caused by client's change of requirements. Clients have the right to change their requirements and to decide on project duration, but consultants should advise them so that they know the consequences of planners working in a tight schedule. Planners use mobilisation period at post-tender stage to revise the original plan where necessary and carry out detail planning. When this period is reduced as a result of the above mentioned concerns during tender period, the duration should be extended to allow planners to carry out planning process effectively.

- In order to improve effectiveness of planning, more integration is required between construction planners and consultants, particularly to avoid a potential mismatch between the time when a contractor requires detailed design information, and a consultants own design output programme.

- Either consultants should use experienced construction planners to look for "constructability" on their designs (as the current trend) or planners of tendering contractors should be brought to the design stage as early as possible, to advise the designers regarding the constructability of the design. However using the second approach may require certain form of incentives to contractors or it could be used in certain forms of procurement methods such as partnering.

- The success of construction project planning is difficult to measure. The current norm is when a project is successful; the success is attributed to factors such as "good design information flow", "good weather", "no variations and re-works" and other factors. However, it is important that when there is a direct contribution of construction planning to a project success, this fact need to be acknowledged in order to motivate the planning team.

- The use of computer technology as a supporting tool for planners should be encouraged. However, consideration should be taken regarding the cost effectiveness. There should be a balance between the need of using it and the benefit it provides, taking into consideration its costs and the contract value (see chapter 2).

## 6.2 Areas for further research

The main objective of this research was to investigate how we can provide an outline to make CPP effective. Although this study is complete in itself, there are areas where further work might be useful. Below are those areas proposed for further research:

- As discussed in earlier chapters, currently in UK there is a trend in which designers are employing (in a casual basis) construction planners to look for "constructability" of their designs. This practice could be beneficial to clients because it reduce the possibility of re-tendering as a result of contractors pricing by higher rates because of unnecessarily complicated designs. A research should be carried out to investigate the cost effectiveness of this practice.

- Planning elements such as programme and method statements are being used as selection criteria by clients or their representatives. The Dubai sample removes these criteria in the selection process because consultants carry out planning. As a result this increases the dependency of using total tender sum, a practice has been shown to increase costs. A study should be carried out to investigate the effect of this practice at tender stage.

- The use of consultants to plan projects appear to be popular in Dubai and may also be useful in UK. However, before recommending such an innovation further investigation is needed. The investigation could target

areas such as the level of conflicts that arises as a result of contractors using a plan which is prepared by consultants.

- During the execution stage of the project, main contractors are responsible for any thing that goes wrong which is caused by their plan which they have prepared. Research should be carried out to investigate the financial consequences to clients, as a result of transferring some or all of these responsibilities to consultants, and whether or not it is appropriate to transfer the resulting costs to clients.

- The effectiveness of the Dubai practices should be investigated to determine client satisfaction, regarding paying for planning activities.

## Outline Model as a General Guide for Conducting Effective Construction Project Planning

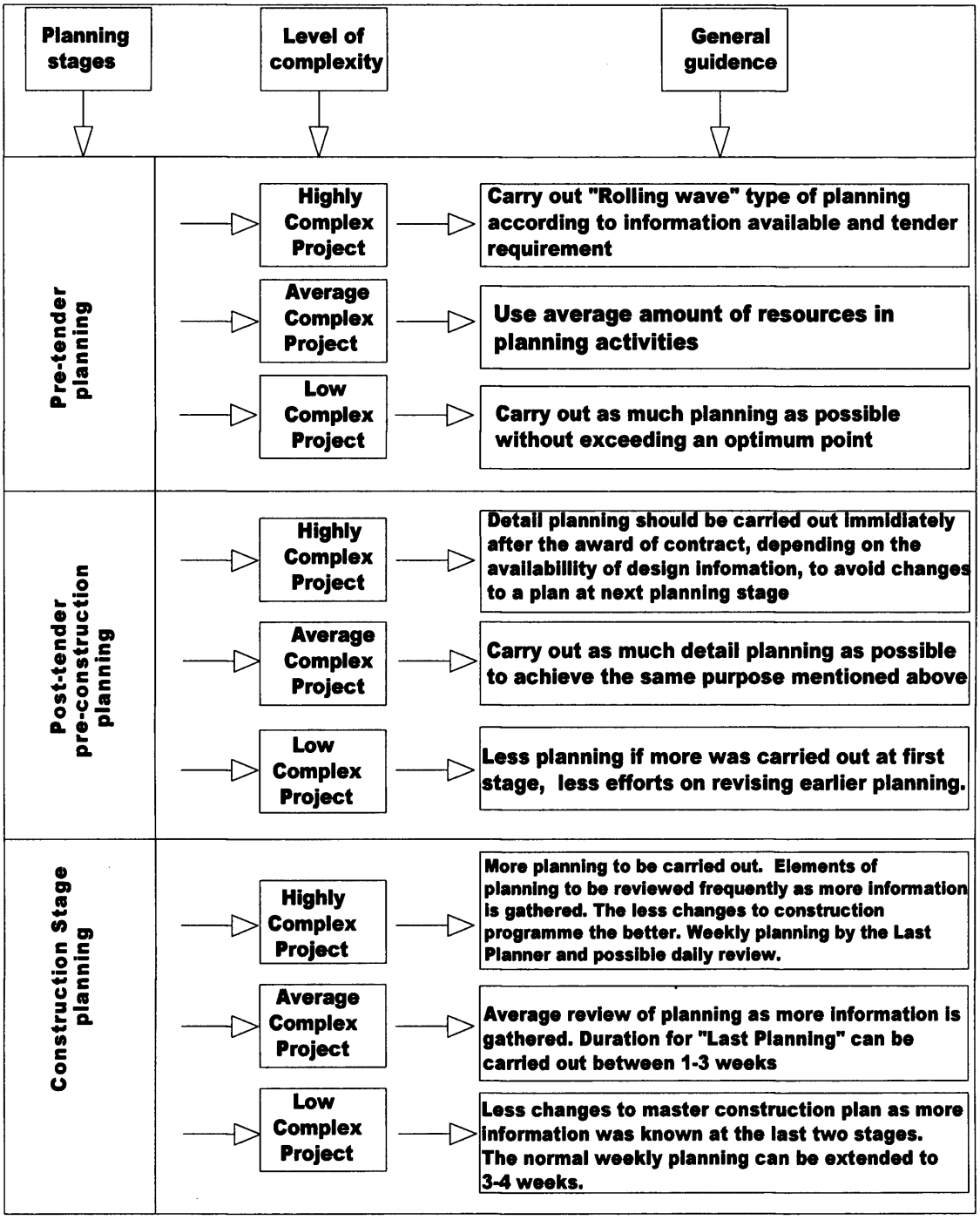



Figure 6.1: Outline model for effective project planning.

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# APPENDICES

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# APPENDIX -1

## Survey Data Sheet

| | Dubai Sample | | | UK Sample | |
|---|---|---|---|---|---|
| | Questions | Answers | Number of Respondents | Answers | Number of Respondents |
| | **General questions** | | | | |
| | Country which the company is registered | Canada & UAE | 1 | UK | 5 |
| | | UAE | 7 | | |
| | | UK | 1 | | |
| | Position of interviewee/planner | Planning Manager | 1 | Senior Planner | 3 |
| | | Director | 1 | Planning manager | 2 |
| | | Project Manager | 5 | | |
| | | Programme Director | 1 | | |
| | Level of education of interviewee | MSc. | 4 | BSc. | 1 |
| | | BSc. | 3 | A - Level | 4 |
| | | BA(Architecture) | 1 | | |
| | Experience of the interviewee | | | | |
| | | 4-7 years | 2 | 12-15 years | 1 |
| | | 8-11 years | 1 | 20-23 years | 1 |
| | | 12-15 years | 2 | 24-27 years | 1 |
| | | 16-19 years | 1 | 40-43 years | 2 |
| | | 20-23 years | 2 | | |
| 2 | What type of building is being built/has been built? | Commercial private client | 5 | Commercial private client | 1 |
| | | Residential private client | 3 | Residential private client | 2 |
| | | Residential public client | 2 | Design and build | 1 |
| | | Residential & Commercial Public Client | 1 | R&D | 1 |
| | | Industrial | 1 | | |

| | Dubai Sample | | | UK Sample | |
|---|---|---|---|---|---|
| | **Questions** | **Answers** | **Number of Respondents** | **Answers** | **Number of Respondents** |
| 3. | What type of procurement method used in this project? | Traditional | 6 | Traditional | 2 |
| | | Design and build | 1 | Design and build | 2 |
| | | Construction management | 2 | Two-stage tender Client Design | 1 |
| | | Management contract | 1 | | |
| | | Fixed price lump sum contract | 1 | | |
| | Question 4 & 5 | Projects with budget overrun by 11-15% | 1 | Company – C | 10.76% |
| | | Projects with budget overrun by 16-20% | 1 | Company – F | 1.67% |
| | | Projects with budget overrun by 21-25% | 1 | | |
| | Question 6 & 7 | Projects with time overrun by 11-15% | 1 | Company – C | 7.69% |
| | | Projects with time overrun by 21-25% | 1 | Company – E | 16.66% |
| | | Projects with time overrun by 36-40% | 1 | Company – F | 3.85% |
| 8. | Do you think inadequate planning contributed to the variation between planned and actual cost? | Yes | 5 | Yes | 1 |
| | | No | 2 | No | 4 |
| 9 | Do you think inadequate planning contributed to the variation between planned and actual duration? | Yes | 5 | Yes | 1 |
| | | No | 2 | No | 4 |
| 10. | Was there a review of the plan? | Yes | 8 | Yes | 5 |
| | | No | 0 | No | 0 |

| Questions | Answers |
|---|---|
| What was reviewed and in what stage?<br>Planning review in different stages. | Please see the table below<br>**UK Sample** |

| Reviewed elements | Company - A | | | Company - B | | | Company - C | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period |
| Programme | √ | √ | √ | √ | √ | √ | | √ | √ |
| Method statement | | √ | | √ | √ | √ | | √ | √ |
| Sequence of activities | √ | √ | √ | √ | √ | √ | | √ | √ |
| Package Procurement Schedule | | √ | √ | √ | √ | √ | | | |
| Design Progress | | | | | | | | | |
| | | | | | | | | | |

| Reviewed elements | Company - D | | | Company - E | | | Company - F | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period |
| Programme | | √ | √ | | | √ | √ | √ | |
| Method statement | | √ | √ | | √ | | √ | √ | |
| Sequence of activities | | √ | √ | √ | | | √ | √ | |
| Package Procurement Schedule | | | | √ | | | √ | √ | |
| Design Progress | | | | | | | | √ | |

| Questions | Answers |
|---|---|
| What was reviewed and in what stage?<br>Planning review in different stages. | Please see the table below<br>**Dubai Sample** |

| Reviewed elements | Company - A | | | Company - B | | | Company - C | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period |
| Programme | √ | | | | | √ | | √ | |
| Method statement | √ | | | | | √ | | √ | |
| Sequence of activities | √ | | | | | √ | | √ | |
| Construction costs | √ | | | | | | | | |
| Cash flows | | | | | | √ | | | |
| Budget | | | | | | | | √ | |

| Reviewed elements | Company - D | | | Company - E | | | Company - F | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period |
| Programme | | | √ | √ | √ | √ | | √ | |
| Method statement | | | | | | √ | | | √ |
| Sequence of activities | | | | √ | √ | √ | | √ | |
| Construction costs | | | | | | | | | |
| Cash flows | | | | | | | | | |
| Budget | | | | | | | | | |

| Reviewed elements | Company - G | | | Company - H | | | Company - I | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period | Pre-tender | Post-tender | Construction period |
| Programme | | √ | | √ | √ | √ | | | |
| Method statement | | √ | | √ | √ | √ | | | |
| Sequence of activities | | √ | | √ | √ | √ | | | |
| Construction costs | | | | | | | | | |
| Cash flows | | | | | | | | | |
| Budget | | | | | | | | | |

How often those elements were reviewed?

## UK Sample

5 – Very often 4- Often 3- Quite often 2- Not often 1- Never conducted

| Reviewed elements | Scale of review | | | | | |
|---|---|---|---|---|---|---|
| | Companies | | | | | |
| | A | B | C | D | E | F |
| Programme | 3 | 5 | 4 | 4 | 3 | 4 |
| Method statement | 1 | 5 | 4 | 4 | 1 | 3 |
| Sequence of activities | 2 | 5 | 4 | 3 | 3 | 3 |
| Package Procurement Schedule | 3 | 5 | 3 | 3 | 2 | 5 |
| Design Progress | | | | | | 5 |

## Dubai Sample

| Reviewed elements | Scale of review | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Companies | | | | | | | |
| | A | B | C | D | E | F | G | H |
| Programme | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 4 |
| Method statement | 3 | 2 | 3 | | 5 | 2 | 4 | 2 |
| Sequence of activities | 3 | 3 | 3 | | 5 | 3 | 4 | 2 |
| Construction costs | 5 | | | | | | | |
| Cash flows | | 2 | | | | | | |
| Budget | | | 2 | | | | | |

12. If planning is divided into main stages such as Pre-tender, Post-tender pre-construction, and planning that takes place during construction period. Out of 100%, what percentage of planning is attributed to those three stages in this project ?

13 Do you think this is the right amount of effort that should be attributed to these stages, or you would prefer some changes to make planning more effective

Please see the table below for question 12 and 14

Question 12 and 14. **Actual percentage of planning attributed to the project, and the preferred percentage.**

| UK Projects | % attributed and preferred | Pre-tender | Post-tender | Construction period | Dubai Projects | % attributed and preferred | Pre-tender | Post-tender | Construction period |
|---|---|---|---|---|---|---|---|---|---|
| A | Actual | 50 | 30 | 20 | A | Actual | 20 | 20 | 60 |
| | Preferred | Right amount | Right amount | Right amount | | Preferred | 40 | 30 | 30 |
| B | Actual | 30 | 30 | 40 | B | Actual | 10 | 10 | 80 |
| | Preferred | Right amount | Right amount | Right amount | | Preferred | 30 | 10 | 60 |
| C | Actual | 75 | 5 | 20 | C | Actual | 40 | 30 | 30 |
| | Preferred | Right amount | Right amount | Right amount | | Preferred | 80 | 10 | 10 |
| D | Actual | 75 | 5 | 20 | D | Actual | 25 | 50 | 25 |
| | Preferred | Right amount | Right amount | Right amount | | Preferred | Right amount | Right amount | Right amount |
| E | Actual | 40 | 50 | 10 | E | Actual | 20 | 50 | 30 |
| | Preferred | 60 | 40 | 0 | | Preferred | Right amount | Right amount | Right amount |
| F | Actual | 10 | 90 | N/A | F | Actual | 40 | 20 | 40 |
| | Preferred | Right amount | 70 | 20 | | Preferred | Right amount | Right amount | Right amount |
| | | | | | G | Actual | 30 | 60 | 10 |
| | | | | | | Preferred | Right amount | Right amount | Right amount |
| | | | | | H | Actual | 40 | 30 | 30 |
| | | | | | | Preferred | Right amount | Right amount | Right amount |

15. Why do you think these changes are necessary?

## UK Sample

**Company - E**

In an ideal world all planning would be carried out early and everything would go to plan. In reality information is not developed early enough, too many options for the client, who do not decide early enough. Project drivers (managers & engineers) are brought in too late

## Dubai Sample

**Company – A**

The construction stage involves extensive and intensive tasks that require to be carried out. The plan should be as much possible be correct before the start of construction to ensure it is a smooth and successful process. Mistakes in the plan (i.e wrong logistics and work sequence usually cause costly delays to the project.

**Company – B**

Delays in Pre Tender Activities reduce Construction duration as completion milestones do not tend to change until a Contractual Claim is lodged (and approved) during construction

**Company – C**

To reduce changes during constructions stage, which usually have both cost and time implications

| Dubai Sample | | | UK Sample | |
|---|---|---|---|---|
| **Questions** | **Answers** | **Number of Respondents** | **Answers** | **Number Respondents** |
| | **Planning effort in pre-tender stage** | | | |
| 16. Who participates in pre-tender planning? | Planner | 7 | Planner | 6 |
| | Estimator/QS | 4 | Estimator/QS | 5 |
| | Project Manager | 8 | Project Manager | 2 |
| | Project Engineer | 2 | Construction Director | 1 |
| | Site Manager | 1 | Design Manager | 1 |
| | | | Construction manager | 1 |
| | | | Specialist sub-contractors | 2 |
| | | | Bid manager | 2 |
| | | | Supply chain manager | 2 |
| 17. Who else do you think should participate in this planning stage? | Short listed contractors | 2 | Statutory service personnel | 5 |
| | Design consultants | 1 | Planning Department | 4 |
| | Client | 1 | Procurement and contracts | 1 |
| | Site manager | 1 | Project manager | 2 |
| | | | Specialist sub-contractors | 1 |
| 18. Which head office departments were involved in pre-tender planning? | Planning and Control | 5 | Planning and Control | 5 |
| | Procurement and contracts | 5 | Procurement and contracts | 1 |
| | Operations | 2 | Operations | 1 |
| | Engineering | 4 | Estimating | 3 |
| | | | Engineering | 2 |
| | | | Business department | 1 |
| 19. Who else do you think should participate in this planning stage? | Senior management | 1 | People with experience of similar project | 1 |
| | Finance | 1 | Contract department | 1 |
| | Planning | 1 | Procurement department | 1 |
| | Operations | 1 | Procurement and contracts | 1 |

| Dubai Sample<br>Questions | Answers | Number of Respondents | UK Sample<br>Answers | Number of Respondents |
|---|---|---|---|---|
| 20. Which external parties are involved in pre-tender planning? | Consultants | 6 | Consultants | 3 |
| | Clients | 4 | Clients | 3 |
| | Specialist contractors | 1 | Specialist contractors | 4 |
| | Sub contractors | 1 | Sub contractors | 3 |
| | Major suppliers | 2 | Major suppliers | 3 |
| 21. Who else do you think should participate in this planning stage? | Clients | 1 | M&E | 1 |
| | Consultants | 1 | Machine Interface manager | 1 |
| | Specialist contractors | 1 | | |
| | Major suppliers | 1 | | |
| | **Planning effort in Post-tender pre-construction stage** | | | |
| 22. Which **internal parties** are usually involved in post-tender planning? | Planner | 6 | Planner | 5 |
| | Project manager | 8 | Project manager | 6 |
| | Estimators/QS | 4 | Estimators/QS | 4 |
| | Project Engineer | 2 | Project Engineer | 2 |
| | Site manager | 2 | Site manager | 2 |
| | Construction Manager | 1 | Commercial manage | 1 |
| | Logistics Manager | 1 | Procurement manager | 1 |
| | Contractor | 1 | Specialist package manager | 1 |

| Dubai Sample | | Number of | UK Sample | Number of |
|---|---|---|---|---|
| **Questions** | **Answers** | **respondents** | **Answers** | **respondents** |
| 23. Who else do you think should participate in this planning stage? | Finance | 1 | Supply chain manager | 2 |
| | Site manager | 1 | Contracts manager | 1 |
| | Client | 1 | M&E | 1 |
| 24. Which head office departments are usually involved in Post-tender planning ? | Planning and Control | 4 | Planning and Control | 4 |
| | Procurement and contracts | 3 | Procurement and contracts | 4 |
| | Operations | 4 | Operations | 3 |
| | Engineering | 2 | Engineering | 1 |
| | Finance | 1 | Accounts department | 2 |
| | | | Supply chain department | 2 |
| | | | Materials buying department | 2 |
| | | | Temporary works | 1 |
| 25. Who else do you think should participate in this planning stage? | Cash flow forecasting | 1 | — | |
| | Operations manager | 1 | | |
| | Project Engineer | 1 | | |
| | Contractors | 1 | | |
| | Procurement and contracts | 1 | | |
| | Project managers | 1 | | |
| | Consultants | 1 | | |
| 26. Which external parties are usually involved in Post-tender planning ? | Consultants | 5 | Consultants | 4 |
| | Clients | 3 | Client | 5 |
| | Main contractor | 1 | Main contractor | 1 |
| | Sub contractors | 4 | Sub contractors | 2 |
| | Specialist contractors | 4 | Specialist contractors | 4 |
| | Major suppliers | 4 | Major suppliers | 4 |

| Dubai Sample<br>Questions | Answers | Number of Respondents | UK Sample<br>Answers | Number of Respondents |
|---|---|---|---|---|
| 27. Who else do you think should participate in this planning stage? | Main contractor | 1 | Health and Safety manager | 2 |
| | Project manager | 1 | Project manager | |
| | Construction manager | 1 | | |
| 28. What was the time between the award of a contract and the commencement of construction works on site? | Less than one month | 6 | 1-2 months | 3 |
| | 1-2 months | 1 | 3-4 months | 1 |
| | 5-6months | 1 | | |
| 29. Was the time sufficient to do detailed planning necessary for construction period ? | Yes | 5 | Yes | 4 |
| | No | 3 | No | 1 |
| 30. Do you think that implementation of planning at Post tender pre-construction stage would be conducted better if more planning was carried out in the Pre-tender stage? | Yes | 6 | Yes | 5 |
| | No | 2 | No | 1 |
| | **Factors that was considered in Pre-tender planning** | | | |
| 31. In the process of Pre-tender planning, what rate of importance would you give to the considered factors? | | | Please see the table (**UK**) for the answer | |

## Question – 31 – The rate of importance given to the considered factors - Dubai Sample

| Considered Factors | Company - A | | | | | Company – B | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Very Important | Important | Quite Important | Not Important | Not considered | Very Important | Important | Quite Important | Not Important | Not considered |
| H.R allocation from main contractors | √ | | | | | √ | | | | |
| Equipments allocation | | | √ | | | | | √ | | |
| Cash flow constraints from head office | | | | | √ | | √ | | | |
| Sub contractors - availability commitment and quotations | | √ | | | | √ | | | | |
| Environmental factors | | | √ | | | | | | | √ |
| Political factors | | | | | √ | | | | | √ |

| | Company - C | | | | | Company - D | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H.R allocation from main contractors | √ | | | | | | √ | | | |
| Equipments allocation | √ | | | | | | √ | | | |
| Cash flow constraints from head office | | | √ | | | | | | | √ |
| Sub contractors - availability commitment and quotations | | | √ | | | √ | | | | |
| Environmental factors | | | √ | | | | | | | √ |
| Political factors | | | | √ | | | √ | | | |

| | Company - E | | | | | Company – F | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H.R allocation from main contractors | | √ | | | | | | √ | | |
| Equipments allocation | | √ | | | | | √ | | | |
| Cash flow constraints from head office | √ | | | | | | | √ | | |
| Sub contractors - availability commitment and quotations | √ | | | | | | | √ | | |
| Environmental factors | | √ | | | | | √ | | | |
| Political factors | | √ | | | | | √ | | | |

| | Company - G | | | | | Company - H | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H.R allocation from main contractors | √ | | | | | √ | | | | |
| Equipments allocation | | √ | | | | | √ | | | |
| Cash flow constraints from head office | | √ | | | | | √ | | | |
| Sub contractors - availability commitment and quotations | √ | | | | | √ | | | | |
| Environmental factors | | | | √ | | | | √ | | |
| Political factors | | | | √ | | | | √ | | |

## Question – 31 – The rate of importance given to the considered factors – <u>UK Sample</u>

| Considered Factors | Company - A | | | | | Company – B | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Very Important | Important | Quite Important | Not Important | Not con sidered | Very Important | Important | Quite Important | Not Important | Not con sidered |
| H.R allocation from main contractors | | | | √ | | √ | | | | |
| Equipments allocation | | √ | | | | | √ | | | |
| Cash flow constraints from head office | | | | √ | | | | | | √ |
| Sub contractors - availability commitment | | | √ | | | | | | | |
| and quotations | | | | | | | | √ | | |
| Environmental factors | | | | | √ | | | | | |
| Political factors | | | | | √ | | | | | √ |
| Whether | | | | | | | | | | |

| | Company - C | | | | | Company – D | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H.R allocation from main contractors | | √ | | | | | √ | | | |
| Equipments allocation | √ | | | | | √ | | | | |
| Cash flow constraints from head office | | | | √ | | | | | √ | |
| Sub contractors - availability commitment | | | | | | √ | | | | |
| and quotations | √ | | | | | | | | | |
| Environmental factors | | √ | | | | | √ | | | |
| Political factors | | | | √ | | | | | √ | |
| Whether | √ | | | | | √ | | | | |

| | Company - E | | | | | Company – F | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| H.R allocation from main contractors | | | | | √ | | | √ | | |
| Equipments allocation | | | √ | | | | √ | | | |
| Cash flow constraints from head office | | | √ | | | | | | √ | |
| Sub contractors - availability commitment | | | | | | | | | | |
| and quotations | | √ | | | | | √ | | | |
| Environmental factors | | | | | √ | | | | √ | |
| Political factors | | | | | √ | | | | √ | |
| Weather | | | | | | | | | | |

| Dubai Sample<br>Questions | Answers | Number of Respondents | UK Sample<br>Answers | Number of Respondents |
|---|---|---|---|---|
| 32. What effect would you expect in terms of bidding success rate, if planning resources is increased at Pre-tender stage? | Very high | 2 | High | 2 |
| | High | 4 | A little | 4 |
| | A little | 2 | | |
| 33. There is a theory that main contractor should not conduct a detailed panning at pre-tender stage, because of the uncertainty of winning the contract. What percentage of bidding preparation cost shold be allocated to planning in this stage? | 1-5% | 2 | 10-15% | 2 |
| | 6-10% | 5 | 16-12% | 1 |
| | 16-20% | 1 | 75% | 2 |
| **A - In a case of single-stage tendering** | | | | |
| **B - In case of a two-stage tender** | 1-5% | 2 | 10-15% | 1 |
| | 6-10% | 3 | 16-20% | 1 |
| | 11-15% | 2 | 50% | 2 |
| | 16-20% | 1 | | |
| 34. **Increasing expenditure** on planning, and therefore having a good plan at Post-tender pre-construction stage, can be justified by the savings that main contractor will make during construction stage, through to the end of project. | Strongly agree | 3 | Strongly agree | 4 |
| | Agree | 5 | Agree | 2 |
| 35. **Increasing time** for planning in any of the three stages is more important in order to have effective planning, than to increase resources. | Strongly agree | 3 | Strongly agree | 4 |
| | Agree | 5 | Agree | 2 |
| 36. Do you think there is normally enough time between the award of a contract, and the commencement of construction works on site, to be able to do detailed planning necessary for construction period? | Yes | 4 | Yes | 4 |
| | No | 4 | No | 2 |

## OPEN QUESTIONS

37. What improvement would you make regarding Construction Planning, if you had to the same process again?

**(Dubai)** Company A – Answer

- Involve the short listed contractors, sub-contractors and specialist contractors in the planning process at pre-tender
- Adopt more intermediate construction milestones connected to penalties or bonuses
- Be more thorough or cautious in reviewing and approving staff for the design and team (consultants, engineer, contractor, etc.)
- Ensure the design/construction information and drawings is correct and complete prior to start of construction
- A lot of time is wasted for competing outstanding designs and material selections and employer /local authority approvals of the same which directly lead to the project.

Company B - Answer

- Allocation of more effort on Pre-tender Planning
- Involve more parties in Pre-tender Planning

**(UK)** Company - A

Understanding the commissioning process better. Having sub-contractors that we are sure we are going to use, otherwise it can cause delays as the case of this project where six weeks delay was caused by changing sub-contractors in between the tendering process.

Company – B

We believe we give the level of resource to planning at all the times indicated in your questionnaire. We have fulltime planners that are allocated to a bid and if successful the project. Our project planners are fulltime on site

Company – C

I would check with client to make sure they have planning permission before we engage on site and begin work.

Company – D

I would engage sub-contractors who are familiar with those specific zinc claddings, which caused project delays.

Company - E

Design must be of good standard and early Commit the programme to a set scope and state assumptions. If options are on the table to assess the effect to implement them, and state a time when all parties must make the decision to accept them.

Company – F None – It dependent on the quality of the planner

## Dubai Sample

38. What is your reason for these changes?

Company A – Answer

- It is wise to control the project in small phases, otherwise small delays over the course of the project can accumulate and amplify into massive delays to the overall project.
- It is necessary to keep off incompetent, unfocused, and lazy individuals who slow in their performance, make unnecessary mistakes, and who can not make quick decisions. All these lead to delay on the project.

Company B – Answer

Consultants and Clients have to be made aware that using duration allotted to Construction Period to cover for pre-tender delays has serious implication on costs, and might impose restrictions on methods statements etc. which can be made strongly by site managers.

Company E – Answer

Avoid past mistakes

---

## UK Sample

Company A – Answer

Commissioning takes longer than I envisaged, and if I knew the process better, I would plan more realistically.

Company D – Answer

It would help to reduce the delays.

Company E – Answer

A lot is lost on interpretation of what the programme is saying. i.e. an uncertain design option will force the planner into a general description and a duration that will hopefully cover most eventualities

39 One way of reducing planning costs at pre-tender planning stage, is for tendering contractors to collectively employ a Project Planning Consultant (PPC) to produce detailed plans for common elements, and leave the individual tenderers to concentrate on the specialised elements at post-contract stage. The PPC should be paid for his services on the basis of "winner pays".

No Comments for this question from Dubai Survey.

40. What do you think should be done to improve cost effectiveness of Construction Planning?

**Dubai Sample**

Company A – Answer

- Direct procurement from by the employer or work packages and materials
- Employing a third party to audit the design and value engineer it
- Be inclined in using modern technological methods which speed up construction, example sleep forming, pre-cast concrete, steel frame, etc.

Company F – Answer

Construction Planning awareness among the team members.

---

**UK Sample**

Company A – Answer

Planners should have a reasonable base of estimating work duration and resources needed, rather than using the "rule of thumb". They should talk more to specialists

sub-contractors so that they can input their resources for a planner to use. The idea of giving sub-contractors planning, and take it to develop it is dangerous, because sub-contractors do not appreciate the importance of planning. This is caused by the fact that they don't know they will do the work or not. So depending on their estimate could be dangerous.

Company B– Answer

Early contractor involvement in the design process to ensure that the project is designed to be built safely to the right quality and time

Company C – Answer

Contractors to be involved in earlier stage together with Professional Quantity Surveyors (PQS) and consultants.
There should be no competitive tendering.

- Contractors should continuously evaluate their programmes
- Clients should be informed every time there is a change which is linked to budget.

Company E – Answer

The plan is to be based on a set scope. All potential changes to be discussed with all parties involved before deciding to ensure change does not exceed budget. The more information you have the more accurate and certain you can be, insufficient design, uncertain choice of direction by leaders / or client will cause grey view of the project

Company F – Answer

Get more planners – i.e. improve training to develop the planning discipline

# APPENDIX - 2

## Interview Questionnaire

## UK Sample

**Please Note:**

- The confidentiality of the information provided in this interview is guaranteed.
- Your cooperation is highly appreciated.

## Interview Questionnaire – UK Sample

**1. General questions**

Interviewee name

.....

Company name.....

Position of interviewee/planner

.....

Level of education of interviewee Diploma ☐ BSc. ☐ MSc. ☐

Other (Please describe).....

Experience of the interviewee as a construction planner

1-3 years ☐ 4-7 years ☐ 8-11 years ☐ 12-15 years ☐ 16-19 years ☐

Other (Please describe).....

2 What type of building is being built/has been built?

Commercial private client ☐ Residential private client ☐

Residential public client ☐ Industrial ☐ R&D ☐

Other (Please describe).....

3 What procurement method is used in this project?

Traditional ☐ Design and build ☐ Construction management ☐

Other (Please describe).....

4 What is the total cost of this project according to your contract? £.....

5 What is the actual total project cost? £.....

6 What is the construction duration according to your contract?.....

7 What is the actual duration .....

8 Do you think inadequate planning contributed to the variation between planned and actual cost? Yes ☐ No ☐

If your answer is yes, to what degree you think it contributed?

5 - Very high ☐ 4 - High ☐ 3 – Average ☐
2 – Low ☐ 1- Not contributed ☐

9 Do you think ineffectiveness of planning contributed to the variation between planned and actual duration? Yes ☐ No ☐

If your answer is yes, to what degree you think it contributed?

5 - Very high ☐ 4 - High ☐ 3 – Average ☐
2 – Low ☐ 1- Not contributed ☐

10. Was there a review of the plan? Yes ☐ No ☐

What was reviewed?

Programme ☐ Method statement ☐ Sequence of activities ☐

Other (Please describe).....

10 In what stage of planning the review was carried out?

| Reviewed elements | Pre-tender | Post-tender Pre-construction | During construction |
|---|---|---|---|
| Programme | | | |
| Method statement | | | |
| Sequence of activities | | | |
| Package Procurement Schedule | | | |
| Other (please describe below) | | | |
| | | | |

11 How often those elements were reviewed?

Please insert the number at "scale of review" column.

5 – Very often 4- Often 3- Quite often 2- Not often 1- Never conducted

| **Reviewed elements** | **Scale of review** |
|---|---|
| | |
| Programme | |
| Method statement | |
| Sequence of activities | |
| Package Procurement Schedule | |
| Other (please describe below) | |
| | |
| | |

12. If planning is divided into main stages such as Pre-tender, Post-tender pre-construction, and planning that takes place during construction period. Out of 100%, what percentage of planning is attributed to those three stages in this project ?

Pre-tender.....% Post-tender Pre-construction .....%

During Construction .....%

13 Do you think this is the right amount of effort that should be attributed to these stages, or you would prefer some changes to make planning more effective?

Right amount of effort ☐ I would prefer some changes ☐

14 If you would prefer some changes, where?

Pre-tender stage.....% Post-tender, pre-construction .....%

During Construction .....%

Other changes (Please describe).....

15. Why you think these changes are necessary?

.....

.....

**Planning effort in pre-tender stage**

16. Who participates in pre-tender planning?

Planner ☐ Project manager ☐ Project Engineer ☐ Site manager ☐

Scheduling engineer ☐ Estimator/QS ☐

Others (Please describe).....

.....

.....

17. Who else do you think should participate in this planning stage?

.....

.....

Why.....

.....

18. Which head office departments were involved in pre-tender planning ?

Planning and Control ☐ Procurement and contracts ☐ Operations ☐

Engineering ☐

Others departments (Please describe)

.....

.....

19. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

20. Which external parties are involved in pre-tender planning?

Client ☐ Consultants ☐ Subcontractors ☐

Specialist contractors ☐ Major suppliers ☐

Others (Please describe).....

21. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

**Planning effort in Post-tender pre-construction stage**

22. Which **internal parties** are usually involved in post-tender planning?

Planner ☐ Project manager ☐ Project Engineer ☐ Site manager ☐

Scheduling engineer ☐ Site manager ☐ Estimators/QS ☐

Others (Please describe)

.....

.....

23. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

24. Which head office departments are usually involved in Post-tender planning?

Planning and Control ☐ Procurement and contracts ☐ Operations ☐

Engineering ☐ Other departments (Please describe)

.....

.....

25. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

26. Which **external parties** are usually involved in Post-tender planning ?

Client ☐ Consultants ☐ Subcontractors ☐ Specialist contractors ☐

Major suppliers ☐

Others (Please describe)

.....

27. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

28. What was the time between the award of a contract and the commencement of construction works on site?

Less than one month ☐ 1-2 months ☐ 3-4months ☐ 5-6months ☐

Other (Please describe)

.....

29. Was the time sufficient to carry out detailed planning necessary for construction period ?

Yes ☐ No ☐

30. Do you think that implementation of planning at Post tender pre-construction stage would be conducted better if more planning was carried out in the Pre-tender stage?

Yes ☐ No ☐

## Factors that was considered at Pre-tender planning

31. In the process of Pre-tender planning, what rate of importance would you give to the considered factors?

**Please tick only one box for each factor**

| Rate of Importance | High | Important | Quite important | Not important | Was not considered |
|---|---|---|---|---|---|
| Human resources allocation from main contractors | | | | | |
| Equipments allocation | | | | | |
| Cash flow constraints from head office | | | | | |
| Sub contractors - availability commitment and quotations | | | | | |
| Environmental factors | | | | | |
| Political factors | | | | | |
| Others (Please describe below) | | | | | |
| | | | | | |
| | | | | | |

32. What effect would you expect in terms of bidding success rate, if planning resources is increased at Pre-tender stage?

Very high ☐ High ☐ Neutral ☐ Low ☐ Not at all ☐

33. There is a theory that main contractor should not conduct a detailed panning at pre-tender stage, because of the uncertainty of winning the contract. What percentage of total bidding preparation expenditure, should be allocated to planning in pre-tender stage?

**In a case of Single-stage tendering**

1-5% ☐ 5-10% ☐ 10-15% ☐ 15-20% ☐

Other (Please describe).....

.....

**In a case of Two-stage tendering**

1-5% ☐ 5-10% ☐ 10-15% ☐ 15-20% ☐

Other (Please describe).....

.....

What is your reason for the above estimates?.....

34. Increasing **expenditure on planning**, and therefore having a good plan at Post-tender pre-construction stage, can be justified by the savings that main contractor will make during construction stage, through to the end of project.

    Please indicate your response below.

    Strongly agree ☐ Agree ☐ Neutral ☐ Strongly disagree ☐

    Disagree ☐

35. Increasing **time for planning**, in any of the three stages of planning is more important in order to have adequate plan, than to increase resources.

    Please indicate your response below.

    Strongly agree ☐ Agree ☐ Neutral ☐ Strongly disagree ☐

    Disagree ☐

36. The question of time – Generally, do you think there is normally enough time between the award of a contract, and the commencement of construction works on site, to be able to do detailed planning necessary for construction period?

    .....

    .....

37. What improvement would you make regarding Construction Planning, if you had to do the same process again?

    .....

    .....

38. What is your reason for these changes?

.....

.....

39. One way of reducing planning costs at pre-tender planning stage, is for tendering contractors to collectively employ a Project Planning Consultant (PPC) to produce detailed plans for common elements, and leave the individual tenderers to concentrate on the specialised elements at post-contract stage. The PPC should be paid for his services on the basis of "winner pays".

Please indicate your response below, on how much you think this idea can help.

It will help alot ☐ It will help a little bit ☐ It will not help ☐

It will not help at all ☐

Why?.....

.....

.....

.....

40. In your opinion through your experience, what do you think should be done to improve cost effectiveness of Construction Planning?

.....

.....

.....

.....

.....

.....

.....

# APPENDIX - 3

## Survey Questionnaire

## Dubai Sample

**Please Note:**

- **The confidentiality of the information provided in this survey is guaranteed.**
- These interview questions should be answered by a Construction Planner, Project manager, Head of department, or other construction personnel who have experience in conducting Construction Planning.
- Please use the cross provided to copy and paste **inside** the appropriate box☐
- Feel free to increase the writing space provided if it is necessary.
- If you prefer to print and fill the survey in hard copy, the UK address to return it is provided at the end.
- **Your cooperation is highly appreciated.**

## Dubai Survey Questionnaire

**1. General questions**

Interviewee name.....

Company name.....

Country which the company is registered.....

Position of interviewee/planner .....

Experience of the interviewee as a construction planner

1-3 years ☐ 4-7 years ☐ 8-11 years ☐ 12-15 years ☐ 16-19 years ☐

Other (Please describe).....

2 What type of building is being built/has been built?

Commercial private client ☐ Residential private client ☐

Residential public client ☐ Industrial ☐ R&D ☐

Other (Please describe).....

3 What procurement method is used in this project?

Traditional ☐ Design and build ☐ Construction management ☐

Other (Please describe).....

4 What is the total cost of this project according to your contract? Dirhams.....

5 What is the actual total project cost? Dirhams .....

6 What is the construction duration according to your contract?.....

7 What is the actual duration .....

8 Do you think inadequate planning contributed to the variation between planned and actual cost? Yes ☐ No ☐

If your answer is yes, to what degree you think it contributed?

5 - Very high ☐ 4 - High ☐ 3 – Average ☐
2 – Low ☐ 1- Not contributed ☐

9 Do you think ineffectiveness of planning contributed to the variation between planned and actual duration? Yes ☐ No ☐

If your answer is yes, to what degree you think it contributed?

5 - Very high ☐ 4 - High ☐ 3 – Average ☐ ☐

2 – Low ☐ 1- Not contributed

10. Was there a review of the plan? Yes ☐ No ☐

What was reviewed?

Programme ☐ Method statement ☐ Sequence of activities ☐

Other (Please describe).....

10 In what stage of planning the review was carried out?

| Reviewed elements | Pre-tender | Post-tender Pre-construction | During construction |
|---|---|---|---|
| Programme | | | |
| Method statement | | | |
| Sequence of activities | | | |
| Package Procurement Schedule | | | |
| Other (please describe below) | | | |
| | | | |

11 How often those elements were reviewed?

Please insert the number at "scale of review" column.

5 – Very often 4- Often 3- Quite often 2- Not often 1- Never conducted

| **Reviewed elements** | **Scale of review** |
|---|---|
| Programme | |
| Method statement | |
| Sequence of activities | |
| Package Procurement Schedule | |
| Other (please describe below) | |
| | |
| | |

12. If planning is divided into main stages such as Pre-tender, Post-tender pre-construction, and planning that takes place during construction period. Out of 100%, what percentage of planning is attributed to those three stages in this project?

Pre-tender.....% Post-tender Pre-construction .....%

During Construction .....%

13 Do you think this is the right amount of effort that should be attributed to these stages, or you would prefer some changes to make planning more effective?

Right amount of effort ☐ I would prefer some changes ☐

14 If you would prefer some changes, where?

Pre-tender stage.....% Post-tender, pre-construction .....%

During Construction .....%

Other changes (Please describe).....

.....

15. Why you think these changes are necessary?

.....

.....

**Planning effort in pre-tender stage**

16. Who participates in pre-tender planning?

Planner Project ☐ manager ☐ Project Engineer ☐ Site manager ☐

Scheduling engineer ☐ Estimator/QS ☐

Others (Please describe).....

.....

17. Who else do you think should participate in this planning stage?

.....

.....

Why.....

.....

18. Which head office departments were involved in pre-tender planning ?

Planning and Control ☐ Procurement and contracts ☐ Operations ☐

Engineering ☐

Others departments (Please describe)

.....

.....

19. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

20. Which external parties are involved in pre-tender planning ?

Client ☐ Consultants ☐ Subcontractors ☐

Specialist contractors ☐ Major suppliers ☐

Others (Please describe).....

21. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

**Planning effort in Post-tender pre-construction stage**

22. Which **internal parties** are usually involved in post-tender planning?

Planner ☐ Project manager ☐ Project Engineer ☐ Site manager ☐

Scheduling engineer ☐ Site manager ☐ Estimators/QS ☐

Others (Please describe)

.....

.....

23. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

24. Which head office departments are usually involved in Post-tender planning ?

Planning and Control ☐ Procurement and contracts ☐ Operations ☐

Engineering ☐ Other departments (Please describe)

.....

.....

25. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

26. Which **external parties** are usually involved in Post-tender planning ?

Client ☐ Consultants ☐ Subcontractors ☐ Specialist contractors ☐

Major suppliers ☐ others (Please describe)

.....

.....

27. Who else do you think should participate in this planning stage?

.....

.....

Why?.....

.....

28. What was the time between the award of a contract and the commencement of construction works on site?

Less than one month ☐ 1-2 months ☐ 3-4months ☐ 5-6months ☐

Other (Please describe)

.....

.....

29. Was the time sufficient to carry out detailed planning necessary for construction period ?

Yes ☐ No ☐

30. Do you think that implementation of planning at Post tender pre-construction stage would be conducted better if more planning was carried out in the Pre-tender stage?

Yes ☐ No ☐

**Factors that was considered in Pre-tender planning**

31. In the process of Pre-tender planning, what rate of importance would you give to the considered factors?

**Please tick only one box for each factor**

| Rate of Importance | High | Important | Quite important | Not important | Was not considered |
|---|---|---|---|---|---|
| Human resources allocation from main contractors | | | | | |
| Equipments allocation | | | | | |
| Cash flow constraints from head office | | | | | |
| Sub contractors - availability commitment and quotations | | | | | |
| Environmental factors | | | | | |
| Political factors | | | | | |
| Other (Please describe below) | | | | | |
| | | | | | |
| | | | | | |

32. What effect would you expect in terms of bidding success rate, if planning resources is increased at Pre-tender stage?

Very high ☐ High ☐ Neutral ☐ Low ☐ Not at all ☐

33. There is a theory that main contractor should not conduct a detailed panning at pre-tender stage, because of the uncertainty of winning the contract. What percentage of total bidding preparation expenditure, should be allocated to planning in pre-tender stage?

**In a case of Single-stage tendering**

1-5% ☐ 5-10% ☐ 10-15% ☐ 15-20% ☐

Other (Please describe).....

.....

**In a case of Two-stage tendering**

1-5% ☐ 5-10% ☐ 10-15% ☐ 15-20% ☐

Other (Please describe).....

.....

What is your reason for the above estimates?.....

34. Increasing **expenditure on planning**, and therefore having a good plan at Post-tender pre-construction stage, can be justified by the savings that main contractor will make during construction stage, through to the end of project.

Please indicate your response below.

Strongly agree ☐ Agree ☐ Neutral ☐ Strongly disagree ☐

Disagree ☐

35. Increasing **time for planning**, in any of the three stages of planning is more important in order to have adequate plan, than to increase resources.
Please indicate your response below.
Strongly agree ☐ Agree ☐ Neutral ☐ Strongly disagree ☐
Disagree ☐

36. The question of time – Generally, do you think there is normally enough time between the award of a contract, and the commencement of construction works on site, to be able to do detailed planning necessary for construction period?

.....

.....

37. What improvement would you make regarding Construction Planning, if you had to do the same process again?

.....

.....

38. What is your reason for these changes?

.....

.....

39. One way of reducing planning costs at pre-tender planning stage, is for tendering contractors to collectively employ a Project Planning Consultant (PPC) to produce detailed plans for common elements, and leave the individual tenderers to concentrate on the specialised elements at post-contract stage. The PPC should be paid for his services on the basis of "winner pays".

Please indicate your response below, on how much you think this idea can help.
It will help a lot ☐ It will help a little bit ☐ It will not help ☐
It will not help at all ☐

Why?.....

.....

.....

.....

.....

40. In your opinion through your experience, what do you think should be done to improve cost effectiveness of Construction Planning?

.....

.....

.....

.....

.....

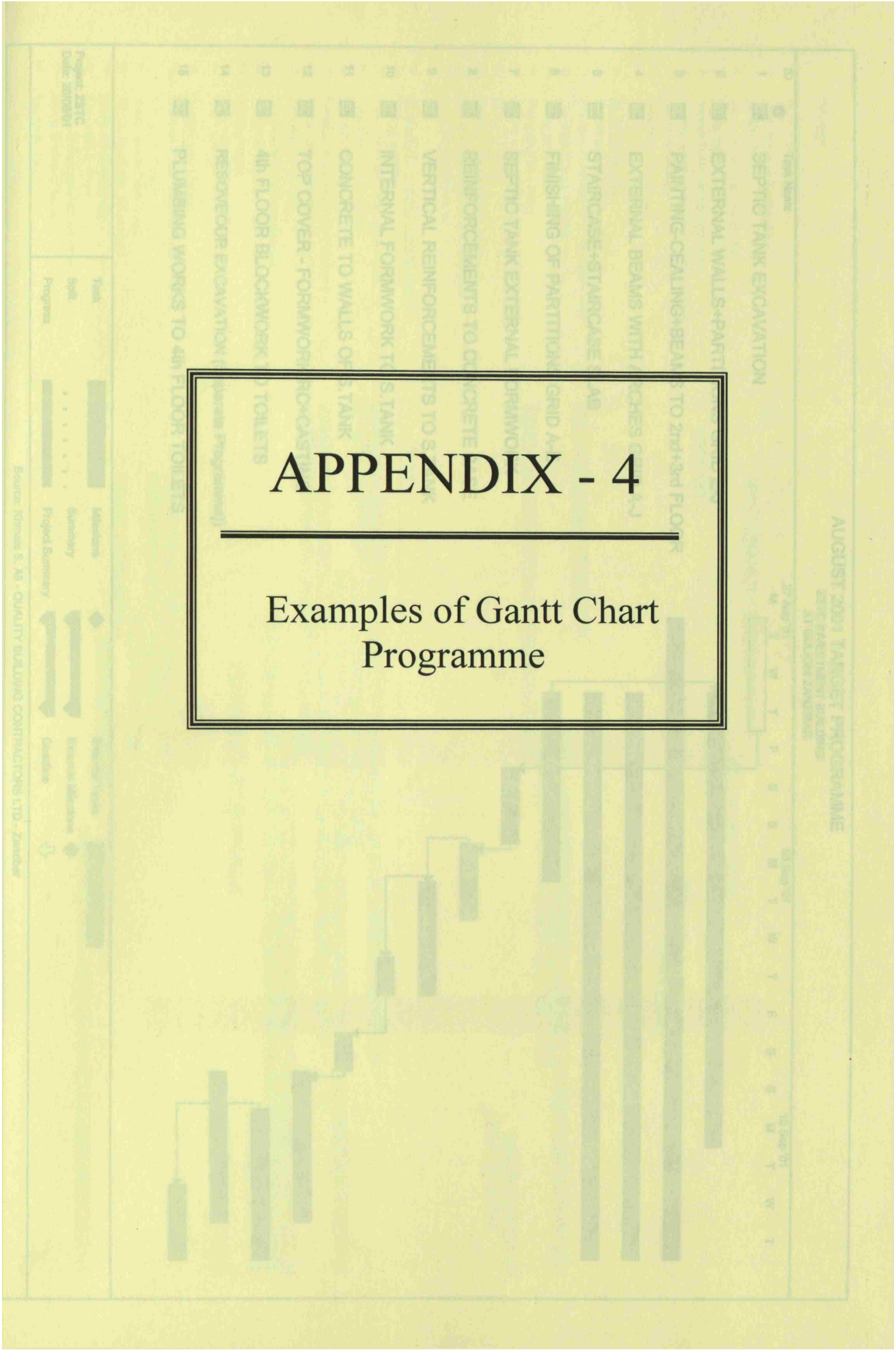
.....

.....

.....

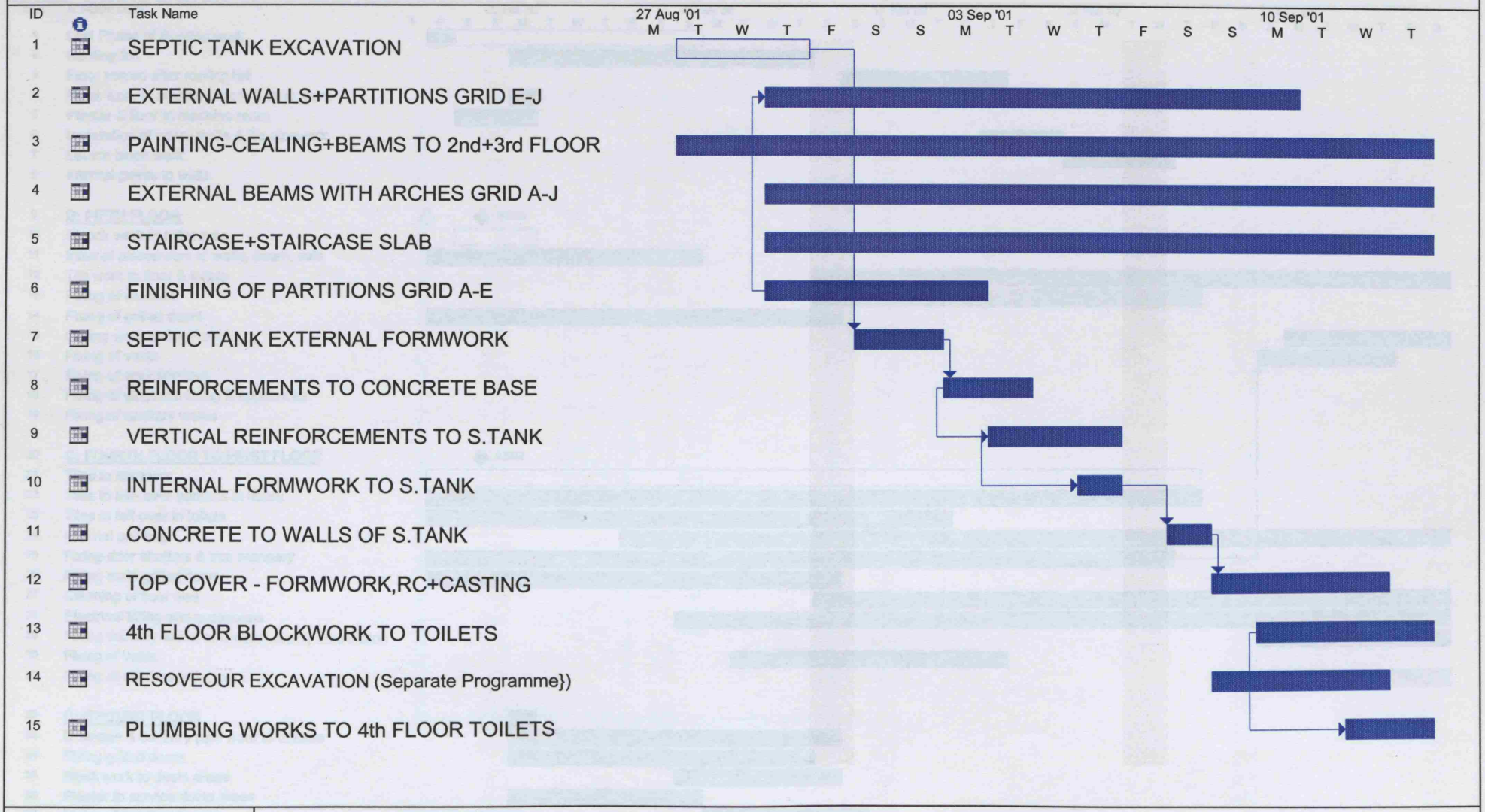
# APPENDIX - 4

## Examples of Gantt Chart Programme



# AUGUST 2001 TARGET PROGRAMME

ZSTC INVESTMENT BUILDING
AT GULIONI ZANZIBAR



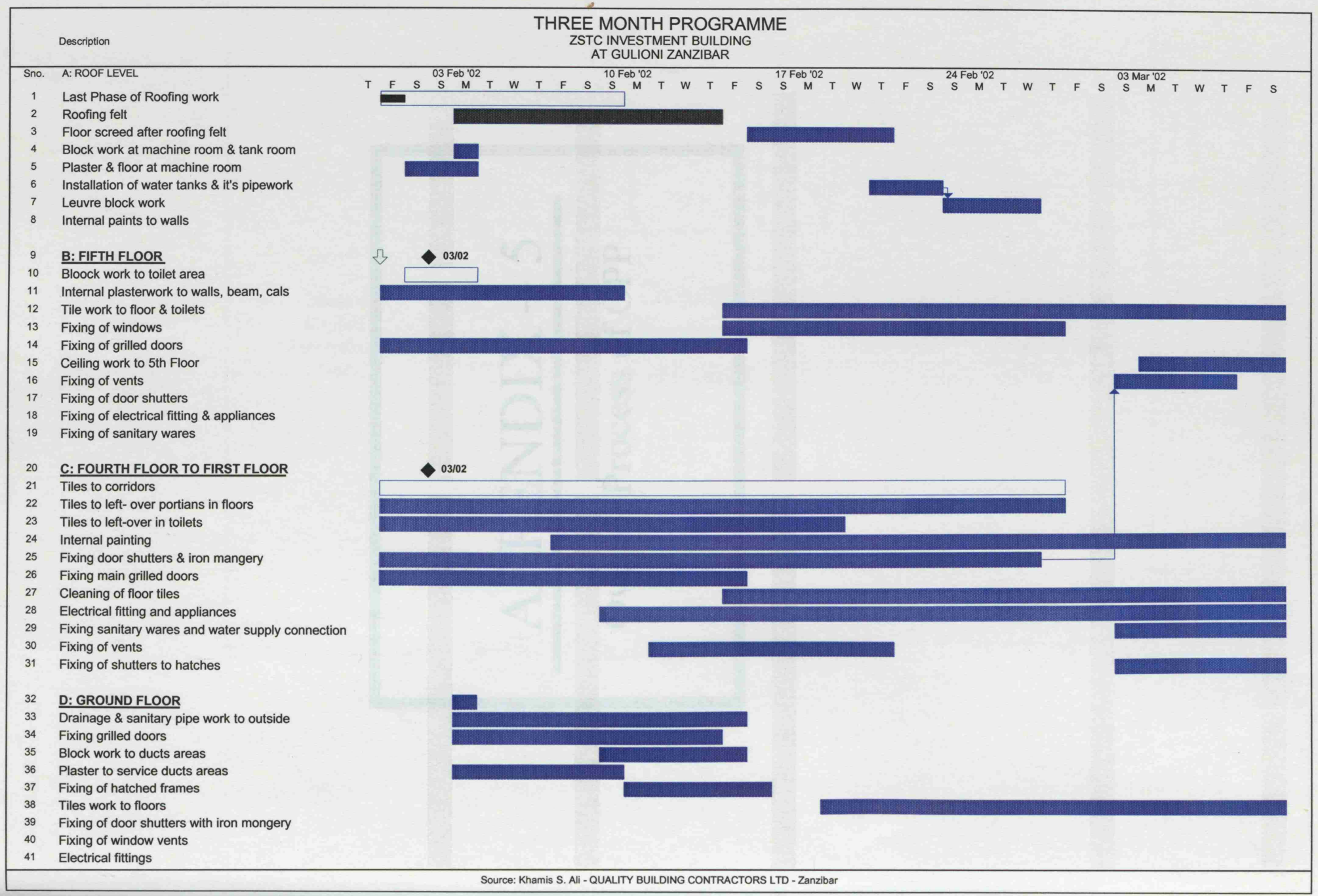

Project: ZSTC
Date: 28/08/01

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

Source: Khmais S. Ali - QUALITY BUILDING CONTRACTORS LTD - Zanzibar

# THREE MONTH PROGRAMME

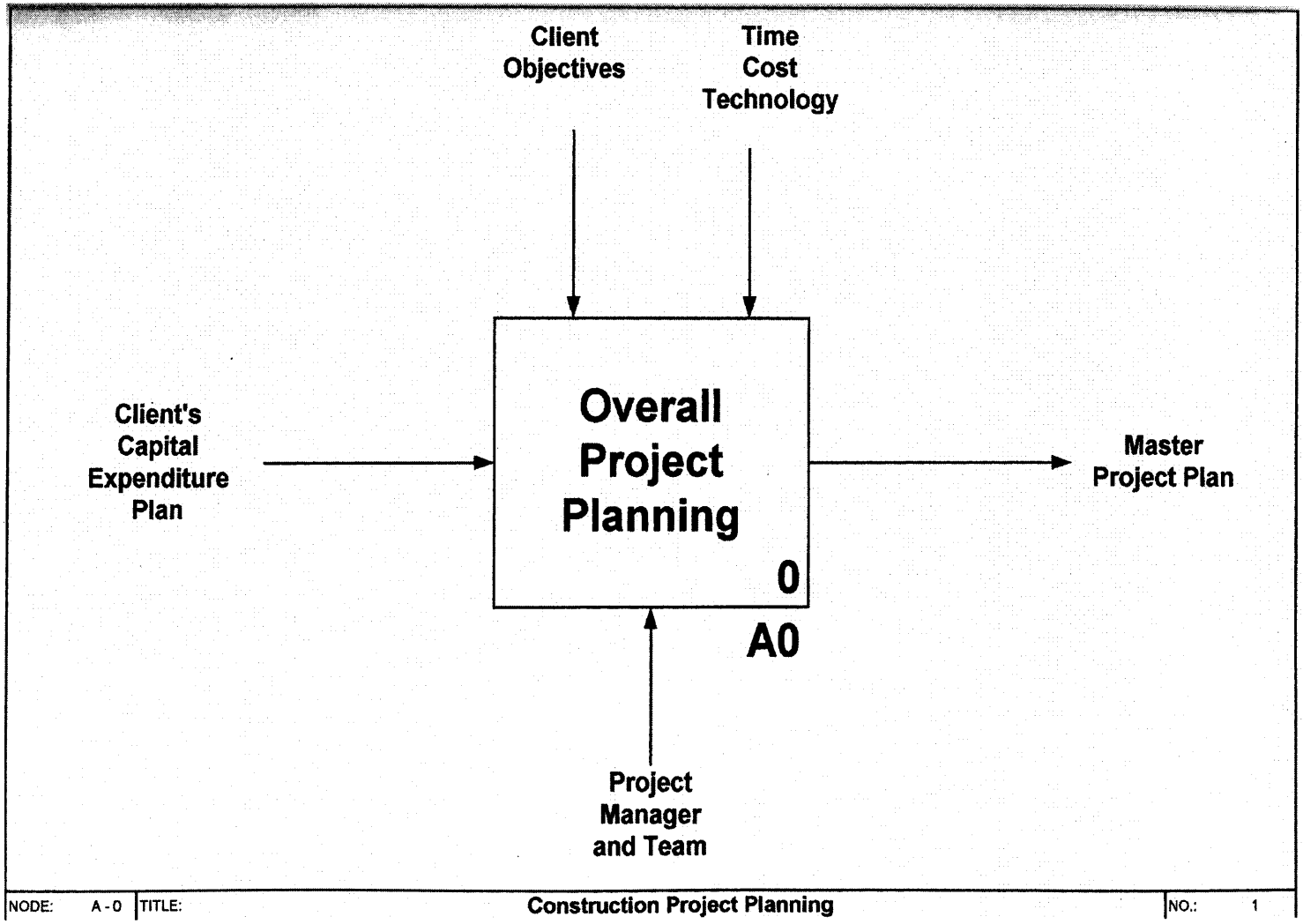
ZSTC INVESTMENT BUILDING
AT GULIONI ZANZIBAR




Source: Khamis S. Ali - QUALITY BUILDING CONTRACTORS LTD - Zanzibar

# APPENDIX – 5

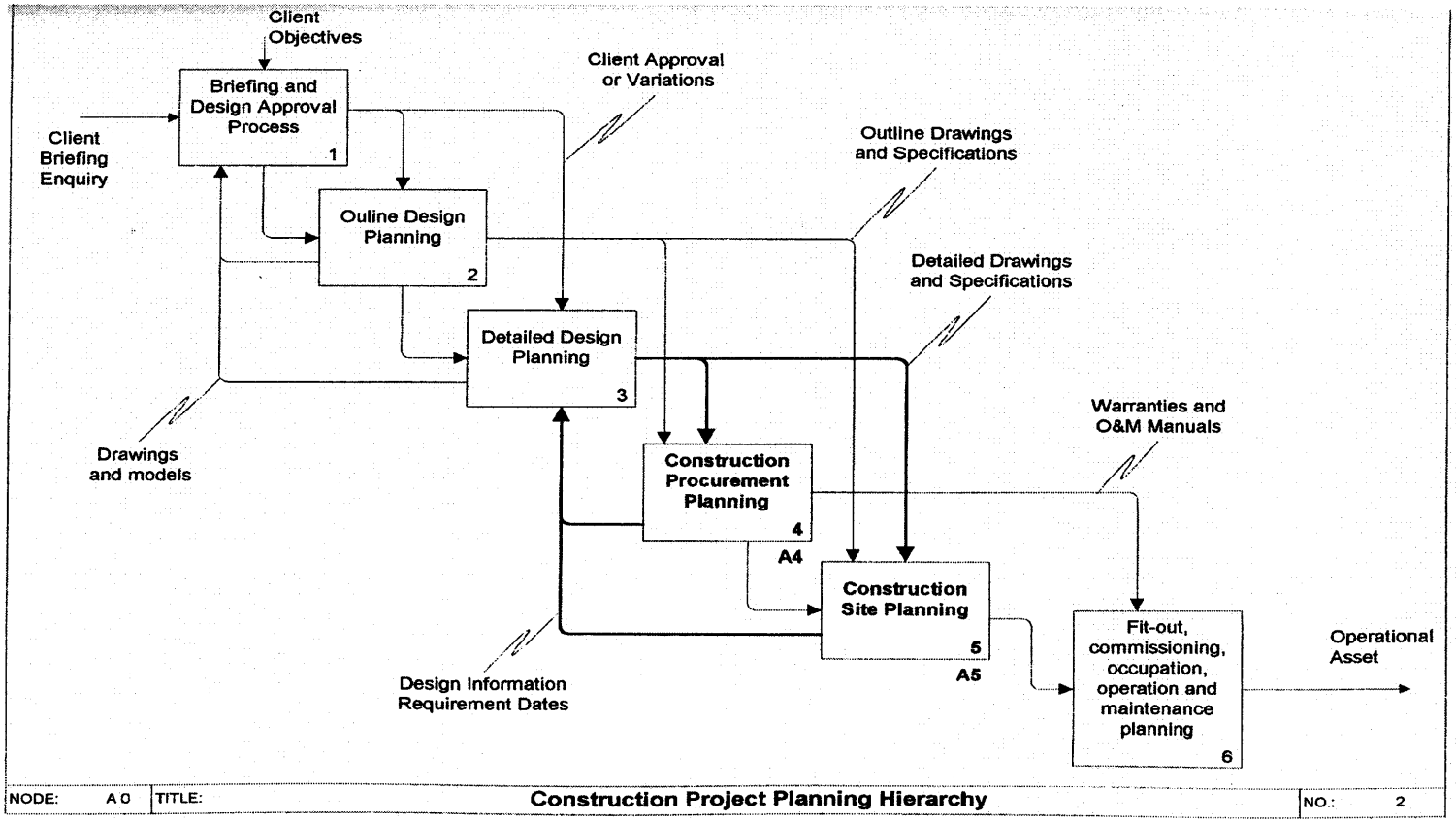
## Overall Process of CPP




Source: Kelsey, J (2000)

# APPENDIX - 6

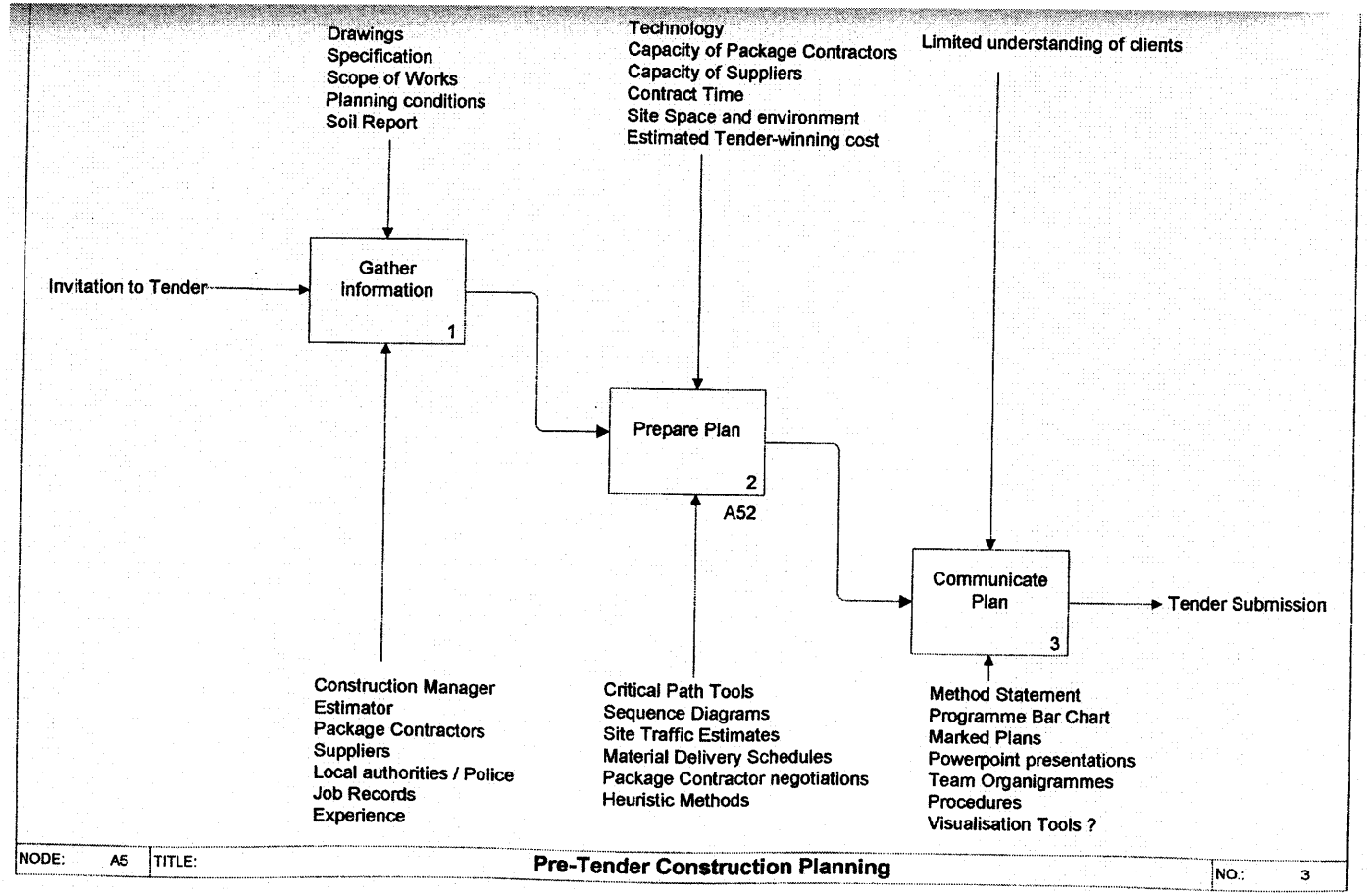
## Construction Project Planning Hierarchy




Source: Kelsey, J (2000)

# APPENDIX - 7

## Pre-tender Construction Planning




Source: Kelsey, J (2000)

**REMINDER:**

Permission to submit this report on 15th September 2006 was granted by Dr. Stephen Pryke and acknowledged by my supervisor, Mr. Miles Shepherd.

Electronic format was submitted on 13th September to Dr. Stephen Pryke before original deadline as per the conditions he gave me.

Thank you for your cooperation.